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Abstract

This paper discusses the expansion or penetration of digital economic activity in the context of developing economies, and what this may mean for economic or structural transformations for countries in the global South. We ask what possibilities new jobs and forms of work in the digital economy hold – in particular platform work – for the productive transformation of economies in ways that contribute to achieving the goals of human, inclusive and sustainable development. What are the impacts on work and workers in this process? The question of whether a 'digital transformation' can spur development and, if so, how and to whose benefit, depends in large part on the nature of employment created, and whether labour can move to higher-productivity sectors which raise incomes while also strengthening the capacity to finance public goods and services, including social protection. This paper provides a synthesis of literature and debates – conceptual, historical and empirical – linking work in the digital economy with ideas of 'structural transformation' and development. Our analysis of historical processes of structural transformation and of the conditions of work associated with contemporary digital platforms points to a range of obstacles to development and, in particular, the breakdown of links between skills, productivity, value and wages, limited capacity of states to invest in relevant infrastructure, and the concentration of capital with access to a global supply of labour. We conclude by considering policy actions that would be needed to direct digital economic transformation towards sustainable, fair and inclusive development.

'Much of the debate on the impact of digital technologies on the world of work(ers) has been speculative and, where substantiated by empirical evidence, it has stemmed primarily from the global North' (https://www.wits.ac.za/scis/research-projects/digital-technologies-the-future-of-workers-and-inequality/).

Keywords: structural transformation, developing economies, platform work, digitalisation, working conditions, productivity, skills, gender

Introduction

This paper discusses the possibilities for 'development' in developing economies under conditions where the penetration of digital technologies becomes, or is assumed to be, a prime driver of growth and employment. What development opportunities do digital jobs offer, and what do they mean for the nature of work and conditions of workers, and, by extension, for local or national development pathways? Digital jobs broadly encompass work using new information and communication technologies, artificial intelligence (AI) and automation, whether within or outside the information and communication technologies (ICT) sector. In this paper, while recognising the importance of automation and digitisation in the wider digital transformation of economies, we focus primarily on work undertaken on or mediated through digital platforms, including location-based work (such as delivery couriers and drivers), or tasks carried out on web-based platforms (from "click-farms" to machine training through business process outsourcing (BPO) and professional services such as legal or software programming). While there is indeed growing evidence that jobs using digital technologies are contributing to economic transformation, including in low and lower middle-income economies, the question remains as to whether, how and under what circumstances they are leading to "development" as variously conceived and measured.

These questions are driven by a concern that dominant analyses of "digital transformation" have marginalised the critical role played by employment and labour in the process of development for lower-income economies. In particular, we note a surprising lack of attention within the field of development economics, whether theoretical or empirical, to the link between digital development and structural transformation[1] as well as a limited focus on issues of employment and conditions of work from a developing country or global South perspective. This is despite excessive inequality and joblessness in many such economies. Where the developmental implications of digital technologies are discussed, the emphasis tends to be on their potential to enhance productivity and efficiency with an assumed link to growth and development, rather than on outcomes such as employment creation, higher wages and "decent" work.

Many analysts particularly from the global North predict that a digital Fourth Industrial Revolution will lead to massive job losses (Frey and Osborne, 2017), with impacts varying by country, or that automation will lead to changes within occupations, in particular their breakdown into specific tasks (Arntz, Gregory and Zierahn, 2019; Chang and Huynh, 2016; Frey and Rahbari, 2016; Nedelkoska and Quintini, 2018).[2] The debate in relation to developing countries often projects a more optimistic view: that digitalisation will create jobs, raise productivity and competitiveness, thus generating growth and enabling countries to move up the value chain. What is needed, it is argued, is for countries to make the required investments in digital infrastructure and skills which can help them to

[1]While structural transformation has traditionally been an important concern of development economics, shifts in the field have led to the neglect of such questions, with a focus instead at the micro-level. Exceptions are found in the work of scholars such as Dani Rodrik and Ha-Joon Chang. Relevant research occurs across a number of other disciplines and fields including information technology, communications, business and management (see for example Fu et al. (2021 a, b) and Matthess and Kunkel (2020)). Economists in the global North (particularly USA and Europe) approach questions about employment and productivity in digital labour from an industrialised economy perspective with different concerns.

[2] Many analysts are concerned with employment implications (whether job replacement, taskification or other impacts), but empirical work largely draws on data from the global North (for example, Brynjolfsson and McAfee, 2014). Limited data is available to answer these questions in many developing countries.

"catch up" – or even to "leapfrog" – stages of growth, and thus drive the structural transformation of their economies to higher productivity and welfare. United Nations Industrial Development Organization (UNIDO), for example, writes that "Technologies such as artificial intelligence, big data and drones can help enterprises in LDCs [least developed countries] enhance their productivity and competitiveness, and move up the value chain ladder in agriculture, industry, and the services sector. Similarly, digital goods and services trade enhances the opportunity for small and medium enterprises (SMEs) to participate in global trade and enhance their financial inclusion."[3]

These optimistic narratives of a digital Fourth Industrial Revolution tend to focus centrally on the role that technology plays in raising productivity and driving transformations of economy and society, underemphasising the question of whether a digital transformation can change the structure of economies in ways that lead to "development",[4] for example through decent working conditions and improvements in livelihood security. Evidence to date suggests that, in fact, aggregate labour productivity has decelerated over the past decades in OECD (Organization for Economic Cooperation and Development) countries, including the United States, and has declined in developing economies (Brynjolfsson, Rock and Syverson, 2019). In addition, latest technologies are concentrated among a small share of firms in advanced economies (Bauer et al., 2020; Brynjolfsson, Rock and Syverson, 2019; Dieppe, 2020; Tambe et al., 2020), while firms in low-income countries generally do not have access to such technologies or the capacity to benefit from them.

Drawing on the experience of countries and workers in the global South, we explore the evidence for and limitations of such a narrative, in terms of both the kind of employment and conditions of work generated, and drivers of growth and development more broadly. By way of background, we note that any process of digital transformation takes place within a broader ecosystem associated with the production and use of technologies. This would include the mining of essential metals as key inputs into digital technologies, the manufacture of such technologies and development of associated infrastructure, the automation or digitalisation of industrial production processes and other traditional work sectors such as finance, e-commerce and services, and the management of electronic waste (UNCTAD, forthcoming). This broader ecosystem thus links also to prominent concerns about resource use, environmental sustainability and changing consumption patterns, all of which have important implications for the position of work and employment within sustainable and inclusive economic development strategies.

In addition, digital penetration in developing countries often takes place against a background of relatively weak state and institutional capacity, limited fiscal resources, excessive levels of inequality and un- or under-employment, unfavourable terms of global supply chain integration and the growing financialisation of economic activity. Within such contexts, Covid-19 further intensified the rapid spread of digital technologies while making visible the often problematic consequences for workers and various forms of employment. These consequences were sometimes disguised behind narratives of employment-creating opportunities and progress surrounding the "digital revolution" (ILO, 2021).

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[3] See https://www.unido.org/news/technology-driver-structural-transformation-ldcs Accessed:20/01/2023.

[4] While the meaning of development remains contested, it has at core an 'irreducible goal of improving living conditions of people' (Nayyar, 2003:62). Such ideas were central to early thinking about structural transformation.

Against this background, the paper critically examines the idea of "structural transformation" and explores the possibilities of a "digital transformation" generating successful structural change under contemporary development conditions. By structural transformation we refer to changes in the sectoral composition of production, employment, demand and trade, as well as the distribution of incomes, reduction in poverty, creation of stable and secure jobs (with better working conditions), and changes in social and economic institutions that can bring about a productive transformation of society. Examining the digital economy within this broader understanding of structural transformation should help us to identify and assess what opportunities digital transformation offers to developing countries, and what actions will be needed to shape these towards sustainable, fair and inclusive development. Do the traditional "stylised facts" of structural transformation – from agricultural subsistence to industrial and service sector employment with increases in productivity and enhanced welfare – any longer approximate the development possibilities or trajectories available to economies in the global South? Do sectoral or organisational changes induced by digitalisation have the capacity to create employment, enhance productivity, raise wages and create decent jobs associated with "development"? What is the role of skills in this process? What can be the role of trade unions or new forms of worker organising and power in influencing government policies and firm behaviour, ensuring that they contribute to a productive transformation for the society and economy? And how does the existing landscape of development and inequality determine the possibilities for, and shape the process of, digital structural transformation as "development"?

This paper provides a synthesis of existing research, evidence and debates – conceptual, historical and empirical – underpinning ideas of "structural transformation" and development, and the digitalisation of the economy. Our purpose is to explore links between these debates from the perspective of work and workers, with a focus on employment creation and conditions of work. Section 2 provides a brief summary of key strands in the literature on structural transformation – from post-war development models to the successful structural transformation of developmental states largely in East Asia. This is followed by the stalled transformations following the rise to dominance of "neo-liberal" economic policies and globalisation, and facilitated by the revolution in information technologies. Section 3 examines changing debates about the role of technology in economic development, both in theory (from old "neoclassical" to new "endogenous" growth models) and in practice during the period of technological change associated with "ICT for Development". Section 4 turns to the recent phase of digitalisation. We draw on the stylised facts concerning skills and productivity, investment in human capital and infrastructure, and the role of capital and technology in assessing how digitalisation and, specifically, work through platforms, has affected the conditions of work and workers. Section 5 assesses the extent to which key features or stylised facts of structural transformation are present in the current shifts towards a digital economy, and suggests some of the key policies, institutional arrangements and regulatory steps necessary to link digitalisation to structural transformation as development. In conclusion, we point to the key policy questions that need to be addressed if key barriers to productive transformations are to be overcome.

Structural transformation, labour and development

Structural transformation and the sectoral reallocation of labour

Structural transformation refers, in particular, to changes in the structure of economies associated with economic growth and development, with the main outcome being the reallocation of labour from agriculture towards more productive economic sectors (manufacturing and services). Key features – often termed "stylised facts" – include higher labour productivity/returns to labour through sectoral and spatial shifts; an increase in skills and human capital, leading to improved incomes and well-being; a shift to formal jobs and institutional arrangements for social security; and more equitable growth and development. What drives structural transformation is the subject of greater debate, but would generally include sectoral change (possibly driven by technology) towards higher productivity activities; changing terms of trade; changing preferences (consumer demand) as incomes increase; and skill-biased technological change following higher investment in education and skills. For the purpose of this paper, the key feature of concern is the reallocation of labour between sectors – particularly when linked to more recent technological change – and the implications for productivity, wages or incomes and welfare.

Writing after the second World War, early development economists theorised that labour would follow more advanced economies in moving from low-productivity activities (subsistence agriculture) to higher-productivity manufacturing and then to services (Lewis, 1954; Solow and Swann, 1956). The intersectoral shift of labour from low-productivity to higher-productivity sectors would generate growth, even in the absence of any increase in productivity within sectors. Building on the earlier (one-sector) growth model of Harrod-Domar, capital accumulation, savings and investment were seen as keys to unlocking growth potential, with technology and changes in productivity taken as exogenous. On the assumption that capital would flow to new and more productive investment opportunities, labour would, in turn, move to the resulting new and more productive jobs. Investment opportunities would reflect a nation's comparative advantage and lead countries to benefit from gains through trade.

In the political context of the Cold War, Rostow (1960) infused these growth models with western assumptions of "modernisation" and cultural change occurring through industrialisation. Rostow argued that developing countries would need to pass through a linear or sequential set of "stages of growth" in order to achieve the transformation experienced by the then-industrialised countries. Rising per capita incomes would be associated with progress towards "modernisation" (Fine, 2003: 202). Increasing productivity and savings – providing the capital necessary for investment – and changes in demand were thus linked to processes of cultural or behavioural change.[5] Furthermore, as labour moved from predominantly low-income subsistence agriculture to higher-productivity skilled manufacturing and then service jobs, demand would increase for higher levels of education or investment in what later came to be termed "human capital"[6] – the returns to which would generate yet higher incomes and well-

[5] Fine also notes the assumption that "increases in productivity, increasing saving rates, development of industry, and so on, would depend upon cultural changes, not least entrepreneurial spirit and the cultural embracing of market and western norms" (2003: 203).

[6] In the 1960s, Schulz (along with other economists such as Becker) developed the theory that "human capital" was a necessary complement to physical capital and its absence a key constraint to development.

being. Associated with these shifts would be the "formalisation" of employment, and the evolution of new institutional arrangements, including the extension of social security.

However, it was soon realised that there was a critical macroeconomic distinction in the nature of unemployment between developed and developing economies (Kalecki, 1976). In developed economies, "unemployment was linked to inadequacy of effective demand; in developing economies, unemployment (under-employment) was seen as structural, resulting from … shortage of capital equipment and supply of necessities" (Ghosh and Rani, 2021: 2). In addition, it became clear that the employment problem could not be solved with the growth of the industrial sector alone. The spatial and sectoral reallocation of labour was not costless: the so-called "reserve army" of rural labour was being absorbed into urban manufacturing and service jobs at low marginal wages – with the surplus generated in agriculture supporting the consumption of non-agricultural goods, thus effectively providing an initial "subsidy" to capital and a "safety net" for workers migrating from the countryside. Redistributive policies or interventions to ensure the provision of what the International Labour Organization (ILO) termed "basic needs" would have to be integrated as part of any development strategy in order to ensure a fair distribution of income and productive employment (ILO, 2009; ILO, 1961).

At the same time, other structural economists and dependency theorists argued that the historical evidence refuted the view of economic development as proceeding through "stages" with a uniform pattern linked to a rise in income per capita**.** They focused instead on the dependent nature of core-periphery relations which created deteriorating terms of trade and "underdevelopment" of colonies. Countries in Latin America and South-East Asia turned to "import substitution industrialisation" (ISI) to build up domestic capabilities and invest in their capital goods industry. In the case of the East Asian economies, these policies formed an important basis for their subsequent export-led growth.

Structural transformation in developmental states

Despite contestation about theories of growth, the "stylised fact" of structural transformation relating to the inverse relationship between the share of employment in agriculture and per capita GDP has proved remarkably robust for those countries which succeeded in moving to middle- or even higher-income status. In practice, however, only a small group of economies since the mid-twentieth century have successfully managed such a transformation, and these were principally located in East and South-East Asia. In those Latin American and South Asian countries where there was initially a rapid expansion of the manufacturing sector associated with ISI, progress subsequently stalled and created a dual labour market (Ghosh and Rani, 2021).

Countries that succeeded in achieving rapid growth in the post-war decades were largely those that shared in the East Asian "export-led" development "miracle" of the 1960s and 1970s. Much has been written about the development pathways of the NICs (newly industrialised countries) and much controversy has been generated over the drivers of their success. What is clear is that countries that succeeded with such a transformation did so through heterogeneous economic pathways and under varied policy regimes. The East Asian "miracle economies" owed their structural transformation and rapid industrial growth, in part, to a successful transition from import

substitution industrialisation, through which they built their capital goods industries and innovation capacity, to an export-oriented industrial strategy. Despite efforts to claim their success as market-led (World Bank, 1993), rigorous scholarship has shown that active developmental states intervened with a range of "selective" industrial and complementary social policies to shape this development trajectory (see, for example, Amsden, 1989; Amsden et al., 2012; Chang, 2002). What emerges from the work of these and other authors (for example, Wade's 1996 critique of the World Bank's East Asian Miracle report) is the critical role played by the state in directing capital through "selective" industrial policies, inducing "patient labour" through repressed wage demands and consumption, while also ensuring "patient capital" that invested for the long term in productive capacities as well as in human capital and social infrastructure. Social policies in these states had a productivist orientation, "helping losers" while enhancing the labour, education and skills needed for industrialisation and innovation.

So, while some broad stylised facts of structural transformation held, this occurred through the operation of quite specific policy regimes and institutional arrangements. Where development did occur, the state played a key role in regulating wages and working conditions, and holding capital to account, while worker organising subsequently became an essential element of struggles to improve wages and working conditions and claim labour and social rights.

Structural transformation under globalisation: Stalled industrialisation and the shift to services

Many developing countries, by contrast, failed to undergo a productive structural transformation and found themselves in a situation of stalled industrialisation, or what Rodrik (2015) more recently termed "premature deindustrialisation", with excessively high rates of unemployment, work that is predominantly classified as informal, "wageless" growth, inadequate social protection and insufficient savings and investment. A number of factors help to explain this failure. Bhaduri (1989) argues that the failure to move labour from agriculture to the industrial sector in many developing economies, in part, reflects inequality in land ownership and other resources. This prompted a massive outmigration of agricultural workers seeking work from rural areas to urban areas, where they moved into low-skilled industrial or service activities as a survival strategy. A spatial reallocation of labour was accompanied by a sectoral shift, but not to higher-productivity manufacturing. Instead, the move was from agriculture to low-skilled and low-income service activities. Looking at the post-1990 period of globalisation, McMillan, Rodrik and Verdusco-Gallo (2014) similarly claim that structural change in African economies has moved labour into low-income, informal employment.

Other explanations relate to the broader context of the rise of neoliberalism in western economies, and associated policies that foster market liberalisation and global integration. Countries attempting a structural transformation from the 1980s thus did so under very different circumstances to those analysed by early development economists or that experienced by the NICs. First, the rise of neoliberalism as a dominant ideology emphasising market-led growth led to the state being viewed as an inefficient barrier to economic transformation. As Nayyar (2003: 62) noted, while the early development literature "emphasised economic growth and capital accumulation at a macro level; contemporary literature on development stresses economic efficiency and productivity increases at a micro level" in keeping with a neo-liberal emphasis on supply side policies and the primacy of markets. As Nayyar also

argues, this reflects a wider failure of "mainstream economics" to distinguish between means (productivity, efficiency) and ends (such as full employment or poverty eradication).

Second, while structural transformation was conceptualised, policies implemented and their results measured at a national level, the role of the nation state in this period was challenged by both the dominant market-led ideology and by globalisation. This phase of globalisation undermined the capacity of states in relation to global capital and in relation to advanced economies and the international financial institutions (IFIs). Capital became increasingly mobile while labour was constrained. Capital flight limited what could be reinvested to contribute to national development. States had fewer resources and less policy space to develop national and industrial policies in line with their own needs, with their policies disciplined by the structural adjustment and stabilisation programmes through which the IFIs imposed neoliberalism.

Third, trade and market liberalisation did not deliver the expected benefits for many developing countries. In theory, countries that liberalised trade should have, it was argued, benefitted according to their comparative advantage, while the global integration of developing economies through trade should have increased the role of foreign direct investment (FDI) which would have not only bridged the savings gap but also generated employment and brought about technology transfer and economic diversification (Lall, 1995). However, in an international environment that was hostile towards trade and industrial policies, and with the imposition of supply side measures on many newly industrialising societies – ostensibly "to create a dynamic economic structure and raise the quality of employment" (Lall, 1995: 539) – there was instead a re-primarisation of output in commodity-dependent economies, growing informality of employment and limited productivity gains.

Additionally, the growing power of multinational corporations and increase in outsourcing through global supply chains did not lead to the anticipated technology transfer and sectoral shifts that had been emphasised in the development literature (Unger, 1988). This was partly because insufficient attention had been paid to the development of capital goods industries which might have enabled developing countries to accumulate technological capability, adapt and innovate, and potentially "leapfrog" in the context of global industrial restructuring, as had been done in the East Asian economies (Perez and Soete, 1988). Outsourcing extended also to government functions, serving to further limit the power and capacities of states to regulate their economies or to tax and redistribute. This was compounded by the disciplining role of IFIs.

Technology and structural transformation

The role of technology in structural transformation

The question then becomes what drives "structural transformation" as development or, as Ocampo (2003) asks, how can countries succeed in the required structural transformations in the contemporary global context – a context in which environmental and sustainability issues have also come to further limit the possibilities for industrialisation as a route to development. For many, a key part of the solution to contemporary development challenges – whether for moving to a green or digital economy – lies with technology. To what extent then does technological change

and, specifically the expansion of digital technologies, offer new possibilities for "development" and for driving the reallocation of labour associated with earlier structural transformations?

An optimistic view that infuses many debates is that technology is now more mobile and accessible at much lower cost; thus (like "capital" in old growth models) "technology will flow to poor countries as they open up to trade and investment: all they need to do is to liberalise, create "market friendly" environments and invest in infrastructure and education" (Lall, 2003:277). This faith in technology in many ways builds on the "new" or endogenous growth theory that emerged in the 1980s[7] and which addressed a number of critiques of the "old" neoclassical growth models. Fine (2003:204) summarised this as follows: that growth is neither steady nor balanced; full employment is presumed, with effortless matching of capital and labour through production functions; the absence of any explanation for changing levels of productivity, or for savings and population, as well as the inability "to account for broader economic and social changes that accompany growth and development as both cause and effect". The new models were concerned principally with the way technology and productivity were integrated into theories of growth or development. "Indeed, even the relationship between structural transformation, (economic) growth and development, and whether growth is "a cause or consequence of development", was contested (Fine, 2003: 201): where early models implied convergence with more advanced economies – new growth models do not. Instead, endogeneity implies increasing returns and economies of scale, with early developers and large economies or corporations accruing an initial advantage which grows over time.

Proponents of new growth theory see investments in skills, infrastructure and technology as key explanations for changes in productivity. Investment (whether private or public) in "human capital" (education and skills for innovation) and infrastructure is an essential part of the wider system and institutions of innovation and is key to transformation to a higher value "knowledge economy".[8] Essential to the growth of these "knowledge" services is the development of new and increasingly powerful information technologies which seem to offer new routes to development for low-income countries. Lall points to "a less sanguine view" (2003: 277), emphasising that the capabilities needed to "access, master, adapt and use" technologies competitively are generally absent and costly to acquire, while constantly upgrading "skills, technology and organisational demands" makes it hard for new entrants to acquire relevant capabilities. For lead firms, the incentives are to concentrate learning and production in a few sites, with economies of scale and agglomeration. These features "make it more difficult for the laggards to catch up" (ibid: 278).

So, what is the evidence that new technologies drive structural transformation, and how have these arguments played out in low-income and developing economies? We first examine the experience of the early spread of ICT technologies and their impact on developing countries before turning to the current phase of digitalisation.

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[7] New or endogenous growth theory is particularly associated with the economist Paul Romer and recognised in his award of a Nobel prize in economics.

[8] The OECD and World Bank have broadly similar frameworks for the knowledge economy with four pillars involving the economic institutions for innovation; education and skills for innovation; the innovation system (including universities, think tanks, etc.), and ICT infrastructure. See for example https://odi.org/en/publications/knowledge-economy-framework/

ICT for Development: Structural transformation under early digitalisation

The development of ICTs in the 1980s was driven principally by the interests of large multinational companies seeking to improve productivity and profitability in an increasingly global market. This facilitated the integration of supply chains through sub-contracting and outsourcing of manufacturing and services, but brought with it the global fragmentation of production. ICTs enabled the emergence of networked organisations, wherein outsourcing, franchising and temporary agency work could be interlinked, blurring organisational boundaries and changing the firm's business model (Grimshaw et al., 2017; Weil, 2014).

From a development perspective, a dominant view at the time was that participation in global supply chains would bring economic benefits, create jobs and improve productivity and competitiveness. Studies have shown, however, that, for the most part, developing countries did not gain because employment opportunities created in the labour-intensive manufacturing sector were largely low-skilled, with poor working conditions and unstable contracts, and led neither to economic nor social upgrading (Anner, 2019; Barrientos, 2019; Gereffi, 2019; Reinecke and Posthuma, 2020). Capital had ready access to an increasingly global reserve army of labour; cost became a determining factor as labour was squeezed, while productivity and efficiency gains from supply chain integration were largely to the benefit of lead firms. The power dynamics that enabled lead firms to adopt "predatory purchasing practices" reflects industry, market and institutional conditions. This had huge consequences for workers, as was observed in events such as the Rana Plaza collapse or during the recent Covid-19 health crisis (Anner, 2019; 2022). This unequal power relationship limits the potential opportunity that global supply chains offer developing countries to transition towards high value-added activities. Instead, it often leads to exploitative labour practices among suppliers, which affects workers, including sub-contracted homeworkers. This process of global integration and outsourcing did foster a growth in the number of small and medium-sized enterprises in developing economies, but these were generally engaged in low-skilled activities, employing a vast number of people at low wage costs who were trying to survive (Sachs, 2004). As developing countries liberalised the rules for cross-border trade and investment, they also deregulated labour markets, effectively providing support to capital under the promise of job creation but providing little scope for workers to unionise and collectively bargain for their rights.

In addition, ICTs were presented as a tool for creating a new "development paradigm" based on the growth of the "knowledge economy" with the potential to transform and rejuvenate different sectors of the economy, improve productivity, create new markets and employment opportunities and thus raise the standard of living in developing countries (Parthasarthy, 2010; Rani and Furrer, 2021). This development provided an opportunity for high-cost destinations, such as the United States and United Kingdom, among other destinations, to offshore, outsource and sub-contract IT-enabled knowledge services through BPO companies, and customer support and technical services, through call centres, to low-cost destinations to reduce operational costs while accessing labour with different skills (Holman et al., 2007; Miozo and Grimshaw, 2011; Teece et al., 1997). Many anglophone countries, such as India, Philippines, Ghana, Uganda, Nigeria, South Africa and Kenya, and some Latin American countries, including Brazil and Guyana, benefitted from call centre outsourcing. While they created employment opportunities, working conditions were quite dismal with strict monitoring of their calls and behaviour, pressure to meet targets, long working hours leading to burnout, low incomes, lack of upward mobility or dead-end jobs (Mirchandani and Poster,

2016; Ramesh, 2004; Taylor and Bain, 2005). As many of these jobs did not require specific skills, they attracted graduates from big cities and small towns who were trained in accent neutralisation and cultural awareness (Taylor and Bain, 2005).

The call centres played a crucial role in enhancing the operational efficiency of firms in advanced economies through internal organisational structures and improving productivity by using cost-effective labour (Holman et al., 2007). Simultaneously, in certain developing countries, these call centres created employment opportunities with varying levels of remuneration and training in language proficiency (English or Spanish accents) to cater to the clients from American or European backgrounds. The employment opportunities created multiplier effects in the local economy which led to an increased demand for services such as transport, restaurants and personal care. However, the jobs were mundane, often not related to the workers' qualifications and did not offer opportunities for skill diversification. As a result, such call centre jobs did not generally lead to any career and technical skill development beyond language proficiency. On the contrary, for many workers the jobs risked eroding the technical skills learned during their tertiary education (Ramesh, 2004). The productivity gains that could be acquired through such an outsourcing model led many large firms in developing countries to adopt a similar strategy, which resulted in the mushrooming of call centres and BPO companies in these countries, mainly creating jobs that were routine and did not require specific skills. However, a smaller proportion of IT-enabled service jobs that required skills for software development and research and design (R&D) activities led to job polarisation and affected the way work was organised.

In other words, any structural transformation through the early ICT revolution was limited: it did not generate employment opportunities in activities that were more knowledge intensive, had higher value added, and that would in turn raise productivity and bring about social, economic and technological transformations in developing economies. For countries that failed to benefit from neo-liberal global integration (particularly across sub-Saharan Africa and Latin America) the current phase of digital technologies linked to ideas of a "Fourth Industrial Revolution" seems to offer a new opportunity – to grow, create jobs and potentially "catch up" earlier technologies or stages of development.

There is increasing debate over whether digitalisation can help developing countries to catch up and achieve economic prosperity and development in the same way that developed countries did through industrialisation (Matthess and Kunkel, 2020). However, there is very little evidence to show how digital transformation can bring about structural transformation (Matthess and Kunkel, 2020), as development trajectories are not driven primarily by technological change and there are other social, economic and institutional forces at work. As Ocampo (2003: 99) has also argued, there is "no automatic mechanism which guarantees that rapid technological innovation in dynamic activities will fuel economic growth: it may simply increase structural heterogeneity" (i.e. dualism and informality). In what follows, we focus broadly on automation and digitalisation through digital labour platforms. We explore the potential of digital transformation to drive sectoral change towards higher-productivity employment and incomes, and ultimately towards understanding whether "digital transformation" is bringing about "structural

transformation", and what evidence there is that this is happening? We examine some of these questions in the next section.

Digitalisation and productive transformation: What does the evidence say?

The rapid development of digital infrastructure since the early 2000s has led to the current phase of digital transformation. This has been driven by the increasing importance of data in the digital economy. Digitalisation allows datafication. Large amounts of data can be collected, which plays a central role in coordinating economic activities across all sectors of the economy (Frederick et al., 2018; ILO, 2021). Advancements in technology have led to cloud computing, high-speed connectivity and data storage, which have enabled the exchange of large amounts of data among individuals, businesses and devices (ILO, 2021).

Platforms play a critical role in the digital economy, with data emerging as an exceptionally valuable asset for them. Platforms collect vast amounts of digital data, enabling the development of new products and services, monetisation of data and continuous improvement of algorithms. The improvement of algorithms also drives increased efficiency and productivity. For instance, in e-commerce platforms, digital data regarding consumer preferences and consumption patterns informs decision-making on product listings, prices and logistics. Likewise, digital labour platforms gather extensive data to identify patterns and business opportunities, employing algorithms for effective governance and management (Choudary, 2018). Ownership and control of such data confer significant power and can result in imbalances between capital and labour (Rani and Singh, 2019). The rise of digital platforms over the past decade has also been strengthened by venture capital funds which recognise the potential of data, its use in artificial intelligence, automation and various economic purposes.

At the same time, technology companies such as Google and Apple, along with the availability of open-source and software-as-a-service solutions, have played a crucial role in the widespread adoption of smart devices. This development has led to innovation. It has facilitated the development of digital platforms, which have penetrated various sectors of the economy and have offered diverse uses and services. These platforms can be broadly categorised into three groups: those that directly provide digital services or products to individual users, such as search engines or social media platforms; those that facilitate interactions between different users, as seen in business-to-business (B2B) platforms in sectors such as manufacturing, agriculture and finance; and digital labour platforms, which act as intermediaries to connect workers with consumers and clients (ILO, 2021). In this section, we focus on the digital labour platforms, which can be categorised into two main types based on where labour transactions take place: online labour platforms, comprising freelance, microtask and talent platforms, and location-based platforms, which include those offering taxi, delivery, care and domestic services, among other services.

The distinct characteristic of the digital economy lies in its ability to outsource tasks or projects globally through online labour platforms. Furthermore, it facilitates work through digital applications in taxi, delivery, care and domestic service platforms. Consequently, this trend holds the potential to bring about a structural and productive transformation within the economy. In this section, we examine some of the stylised facts of the structural

transformation debate discussed earlier to assess whether the ongoing digital transformations through digital platforms are indeed bringing about such a transformative shift.

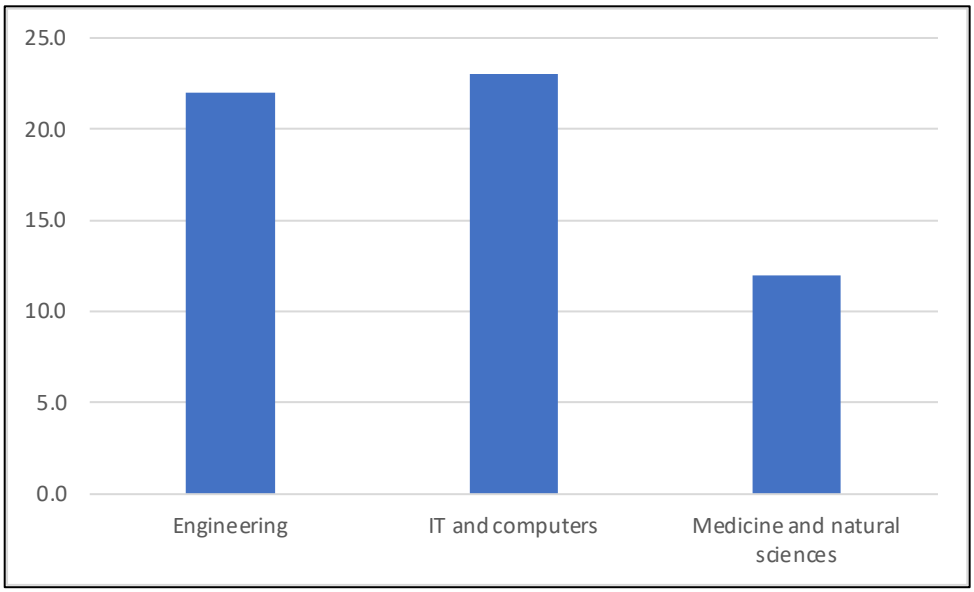
Reallocation of labour

Some researchers have argued that digital labour platforms can potentially mitigate poverty and inequality in developing countries as they create income-generating opportunities (Schriner and Oerther, 2014; Sundararajan, 2016). However, it is important to note that a wide range of tasks, such as taxi, delivery and domestic services, have traditionally been performed within the conventional labour market and continue to be conducted there (ILO, 2021). This implies that workers largely remain within the same sector, and there is no significant sectoral reallocation of labour. While there may be a small proportion of workers who transition from rural to urban areas as seasonal workers to provide taxi driving or delivery services and supplement their incomes (Surie and Sharma, 2019), this shift can be seen as more of a temporary phenomenon rather than a substantial sectoral change. This phenomenon is not unique to the digital era. Historically, agricultural workers have migrated to urban areas to engage in construction and low-skilled service sectors. The current digital era simply represents a continuation of this process.

The emergence of the digital economy and web 2.0 has introduced a range of new microtasks focused on image and data annotation, labelling, categorisation and data processing. These tasks can be described as short, repetitive and well-defined tasks that can be completed by human workers within seconds or minutes. These tasks can be broadly categorised into two groups: those related to AI and machine learning (data labelling, image annotation, content moderation, etc.) and those centred on promoting products and services (content access, market research and reviews, surveys and experiments, etc.). These tasks are outsourced globally through online microtask platforms, as well as to BPOs and contact centres, thus creating new employment opportunities.

According to a global survey conducted by the ILO, approximately 57% of microtask workers in developing countries possess university degree in STEM education (Science, Technology, Engineering and Mathematics) and medicine (see Figure 1). Many of these workers have migrated from rural to urban areas in pursuit of education and employment opportunities. However, they are now engaged in performing tasks on microtask platforms and in call centres and BPOs in urban areas due to limited employment opportunities. Technology companies, such as Meta (the parent company of Facebook), Alphabet (the parent company of Google), and Microsoft, are also outsourcing tasks such as content review and moderation, data annotation, image tagging and object labelling to BPO companies located in countries such as Kenya, India and the Philippines, often at low cost (ILO, 2021, see also the recent case of OpenAI (Perrigo, 2023)). The aim of many of these companies is to provide employment opportunities and generate positive social impact in developing countries.

Figure 1: Field of education of workers performing AI and machine-learning tasks and promotion of products and services, developing countries



Source: Author's calculations based on ILO global survey of workers on microtask platforms, 2017

Furthermore, there is an increasing trend towards developing AI-related tools, such as virtual assistants for secretarial tasks, which have gained popularity and are used extensively in advanced economies such as the United States. However, it is crucial to note that these tasks are not performed by AI systems but rather by highly educated, yet often invisible workers who work as "humans-in-the-loop", operating behind computers in countries such as India and the Philippines, either on digital platforms or within BPO companies (ILO, 2021; Rani and Dhir, 2024). As a result, while developed countries may experience job losses or reclassification of tasks, employment opportunities are created in developing countries, primarily in low-end services. Moreover, the secretarial job is fragmented into different tasks from developed countries to developing ones, particularly in Asia and Africa, often leading to a decline in wages, especially in developing countries.

These trends of digitalisation show that highly educated workers, instead of transitioning to higher-end service sector jobs, seem to shift from agriculture to low-end services, such as microtask work. This phenomenon contradicts the commonly observed trend where higher levels of education typically result in better employment prospects within the services sector. In addition, many of the tasks performed by the workers can be harmful and toxic to their mental health (for example, reviewing disturbing images or videos), and are often unrelated to their educational qualifications (ILO, 2021). This raises fundamental questions regarding the nature of jobs that should be created.

Finally, the current wave of digitalisation has created a new means of outsourcing work through online freelance platforms. This can be seen as a continuation of the previous trend that involved the outsourcing of both manufacturing and IT-related services. However, this wave goes beyond specific sectors and encompasses a broad spectrum of tasks in the services sector, such as design, software programming, web development, translation,

financial, legal and patent services. Many of these tasks were traditionally performed within the conventional labour market, suggesting that the sectoral shift of labour may be limited. Nevertheless, due to the global nature of online freelance platforms, there is intense competition among workers to access and secure work, which could lead to a race to the bottom in terms of wages for those based in developing countries. This is largely because workers adopt various strategies to obtain work, such as subscribing for plans on platforms, paying fees to ensure that their proposal or bid is prioritised, subsidising work (performing work without payment) or underbidding (ILO, 2021; Rani et al., 2023). This implies that, despite high levels of education and skills, many workers might end up with lower incomes due to global competition for work on these platforms.

While these platforms do not necessarily bring about a sectoral change in the economy, since work continues to be performed in the same sectors, they do bring about transformations in labour processes and work relationships. One notable aspect is that platforms classify workers as self-employed or independent contractors rather than employees, thereby depriving them of employment-based labour rights and social protection benefits. Platforms have thus created new forms of dependency, wherein workers from developing countries cater to clients in the global North, inadvertently foregoing opportunities for structural transformation. In many ways, the ongoing digital transformation of work through platforms resembles the classic dependency theory that emerged in Latin America during the 1960s and 1970s, albeit now facilitated by digital technology.

Impact on firm and worker productivity

Digital platforms have emerged as powerful tools to enhance productivity and efficiency within firms, primarily by reducing transaction costs. While there is no systematic evidence demonstrating a direct correlation between platform usage and increased firm productivity, there is ample evidence showcasing the potential for platforms to improve overall efficiency. Firms have increasingly adopted talent platforms such as Kaggle, HackerRank and others for their recruitment processes, leveraging hackathons, competitions and challenges to assess the technical skills of potential candidates. This approach streamlines the screening process, minimises time lags and facilitates the creation of a qualified shortlist of candidates, while also assisting in the reduction of bias during selection (Grooms, 2017). In addition, firms reduce transaction costs when using these platforms.

Furthermore, online freelance platforms have become indispensable for both start-ups and large corporations, including Fortune 500 companies, which seek to outsource a wide range of activities such as IT, operations, marketing, and research and development. These platforms provide access to highly skilled professionals from around the world who are available 24/7. This results in cost reductions and improved efficiency for firms (Corporaal and Lehdonvirta, 2017; Deloitte, 2019; ILO, 2021;). Fuller et al. (2020), through their survey with 700 businesses in the United States, also found that approximately 40% of firms using talent and freelance platforms, such as InnoCentive, Freelancer, Toptal and Upwork, reported increased productivity and innovation.

Firms are increasingly leveraging online microtask platforms as a cost-effective solution to handling vast amounts of data, which can be used for various automation and economic purposes. For instance, the CEO of a major microtask platform disclosed that 80% of their clients were large companies, and some of these companies used the

platform to process 100 million lines of data annually "for annotating, classifying, and categorizing data to make it machine-readable and train machine-learning algorithms" for future automation (ILO, 2021: 108). The speed at which tasks can be completed through these platforms empowers firms to reduce labour and transactional costs, while simultaneously transforming the way in which work is organised and business is operated.

The training of machine-learning algorithms and the increasing use of AI tools in firms also augments the work of highly skilled workers and improves productivity. However, human intervention (microtask workers) still remains crucial for training of AI and machine-learning algorithms. However, the returns to labour for the workers in the AI value chain are very low (around US$ 2), especially in developing countries (Rani and Furrer, 2021). Interestingly, although these workers contribute to the development of AI tools, the value of their labour is neither recognised nor rewarded, and incomes do not increase over time but remain stagnant (Rani and Furrer, 2019).

Talent platforms have become instrumental for both IT and non-IT firms, including automobile manufacturers and public sector institutions, to expand their knowledge boundaries, drive innovation, leverage advanced technology and develop new capabilities for their workforce (ILO, 2021). These platforms host various challenges that allow firms to source AI-driven solutions for specific problems. A noteworthy example is the marathon match challenge on Topcoder by NASA, wherein the Topcoder community has to develop solutions to reduce the background noise in the Large Angle and Spectrometric Coronagraph (LASCO) data, in order to enhance the visibility of comets and facilitate comet discovery and tracking. This challenge drew participation from 596 contestants from 74 countries, and the outcome included 27 unique submitters with 212 submissions. Three winners were finally selected. The solutions not only helped to discover two previously unidentified comets, including a difficult-to-detect non-group comet, but also to modernise and improve NASA's older image processing tool.[9] The ability to assemble a community of software programmers, coders and developers for targeted projects, facilitating flexible resourcing and obtaining multiple innovative solutions within a short timeframe, significantly enhances firm productivity and efficiency. Furthermore, the collaboration between in-house workers and this pool of programmers could foster knowledge exchange, strengthen in-house capabilities and potentially contribute to improved productivity.

The emergence of these platforms facilitates workforce adjustments within firms and leads to the adoption of non-standard work arrangements, such as short-term, fixed-term, temporary and hourly contracts, among other work arrangements, for both core and non-core tasks (Deloitte, 2019; ILO, 2016; ILO, 2021; Weil, 2014). A notable example is Alphabet (the parent company of Google), one of the major tech companies, which reportedly secures various types of employment contracts and relies on a shadow workforce to fulfil tasks.[10] Similarly, Gusto, a payroll and HR platform serving over 200 000 small and medium-sized companies in the United States, reported a 23%

[9] This challenge was posted by NASA who wanted to use Artificial Intelligence (AI)/Machine Learning (ML) to automatically detect comets in data recorded by the Large Angle and Spectrometric Coronagraph (LASCO) telescope on the European Space Agency (ESA) and Solar and Heliospheric Observatory (SOHO) at NASA Goddard Space Flight Center. For more details see: https://www.topcoder.com/case-studies/nasa-soho-comet-search/ (accessed on November 26, 2023).

[10] See https://www.theguardian.com/technology/2021/sep/10/google-underpaid-workers-illegal-pay-disparity-documents for details.

increase in contractor payments over the past two years, resulting in one in five employees being classified as contractors (Wilke and Bowen, 2022).

In such ways, platforms have enabled traditional firms to adopt diverse work arrangements. While this approach can enhance firm productivity, it also creates a dual or multiple workforce structure within both the firm and the broader economy, characterised by varying levels of labour productivity and remuneration for their work. Those in formal and standard contractual arrangements tend to experience higher returns to labour with work-related benefits, compared to individuals with non-standard work arrangements, such as short-term, fixed-term and temporary contracts, whose labour productivity and returns are relatively lower. Furthermore, the hourly and task-based workers on platforms typically face even lower returns to labour, and do not have any work-related benefits.

Platform companies have also disrupted traditional sectors, such as the taxi and delivery sector, and have segmented the labour market. These companies have a small internal core workforce that is employed by the platform and which has an employment relationship with all work-related benefits. But they have a large outsourced workforce whose work they mediate and which is paid on the basis of tasks. Furthermore, they do not enjoy any work-related or social protection benefits (ILO, 2021; Rahman and Thelen, 2019; Rani et al., 2022b). As a result, the labour productivity of the small internal workforce is far higher than that of the outsourced workforce. The outsourced workers (external workforce) also have to pay the platform a part of their earnings as commission fees. The productivity of platform companies hinges on several factors. Firstly, the gamification approach they employ, particularly in the taxi and delivery sectors, wherein they incentivise workers with bonuses which leads to long working hours, but which generates increased revenue for the platform. Secondly, outsourced workers often pay a portion of their earnings as commission fees to the platforms, which typically ranges between 5% and 40% depending on the platform. Additionally, workers may also incur different types of fees or subscribe to specific plans to access work on freelance platforms (ILO, 2021). For example, on a major freelance platform, 62% of the US$300 million revenue was derived from charging various fees to workers, compared to 38% from clients (Upwork, 2019). Thirdly, the investment in capital assets and operational costs, such as fuel, internet or electricity, is shifted to the workers, allowing platforms to maintain agility. This strategy enables platform companies to enhance revenue and increase productivity for both the firm and its core workforce by shifting risks and costs to the workers. Finally, to enhance efficiency and productivity on platforms, algorithmic management tools are employed. These tools serve to allocate, manage, monitor, evaluate and exert control over workers.

However, it is important to note that many of the platform companies operate at a loss and rely on venture capital funds used to bet on platforms dominating the market which creates a "winner-take-all" situation (ILO, 2021; Kenney and Zysman, 2018). The motivation behind support from venture capitalists lies in the ability of digital platforms to collect and store vast amounts of user data, which is a valuable strategic economic resource. However, the prolonged funding provided by venture capitalists raises questions about the sustainability of these platforms as well as their economic and social impacts (Kenney and Zysman, 2018).

Impact on worker skills

Does the ongoing digitalisation contribute towards improving workers' skills and careers? As mentioned earlier, a significant proportion of workers with high educational levels in developing countries are performing low-end microtasks. Some of these tasks on microtask platforms may be "dead-end" jobs that are routine in nature with no learning or enhancement of knowledge for future career development, particularly for workers in developing countries (Berg et al., 2018; Rani and Furrer, 2019). Workers also often face challenges in reflecting their diverse experiences and tasks on microtask platforms on their CVs (Rani and Furrer, 2019), which are often not recognised by employers in traditional firms (Anwar and Graham, 2022; Rani and Furrer, 2019).

There are also significant concerns about deskilling of work due to platforms. As tasks are unbundled through a matrix of algorithms and further fragmented into discrete microtasks (digital Taylorism) they can lead to deskilling of work (Cheng et al., 2015; Kittur et al., 2013). Some of the highly skilled and professionally certified labour in activities such as translation, speech transcription and copy-editing are at risk of being replaced or displaced by lower-skilled labour. This trend raises concerns about the potential creation of a global sweatshop of digital labour (Méda, 2019), which can have significant implications for the development process.

Furthermore, digital platforms are also altering the skill requirements within firms. Instead of hiring workers with "I-shaped" profiles, which involve deep expertise in a specific technology, or "T-shaped" or "pie-shaped" profiles, which entail in-depth knowledge applicable to different industries, firms are now seeking workers with "X-shaped" profiles (ILO, 2021). Workers are expected to possess software and design expertise alongside detailed knowledge of business strategy and implementation. This allows firms to leverage their workforce in managing projects from design to implementation while collaborating with platforms. While this strategy enables agility and cost-effective skill solutions for firms, it also raises questions about development of human capital within the firm as a long-term strategy. In addition, it introduces risks regarding the quality and continuity of services provided by platforms. There is also a potential risk of deskilling some of the IT-related tasks because the projects are often fragmented into a series of small challenges for competitions or hackathons by the platform along with the client. The solution of the different challenges is then reassembled and submitted back to the client as a project, which is efficient for the client but risks deskilling workers who might not have a complete picture of the final outcome. While new technologies hold great promise, they also contribute to a deskilling process that diminishes the availability of high-earning jobs and can potentially undermine the level of professionalism in various work activities.

More equitable growth and development

The development of the digital economy within a country is closely linked to the availability of adequate digital infrastructure, which is currently distributed unevenly worldwide. Developing countries, in particular, face challenges in closing the gap with the digital infrastructure levels of their developed counterparts. Furthermore, significant disparities exist in internet connectivity rates between rural and urban areas in these countries, according to a survey done in 2019, with connectivity rate in urban areas (72%) being twice that in rural areas (38%) (ITU, 2021). Developing countries such as India, which have made notable advancements in IT-enabled services and software development, still encounter challenges in areas such as internet bandwidth, connection speed and network

readiness (UNCTAD, 2018). These challenges can be attributed to the high costs associated with acquiring additional international bandwidth necessary for accessing servers and data centres located overseas, which impedes the widespread adoption of cloud services (UNCTAD, 2019).

The landscape of cloud infrastructure and cloud computing services is largely dominated by a small number of multinational companies, such as Alibaba, Alphabet (the parent company of Google), Amazon, Apple, Meta (the parent company of Facebook), Microsoft and Tencent. These companies, based in the United States and China, have achieved remarkable market capitalisations, with each having surpassed the US$ 1 trillion mark by the end of 2021 (Vega, 2021). They play a critical role in driving innovation, managing infrastructure and shaping the development of the digital economy (ILO, 2021). As a result, about one-third of the digital labour platform companies are based in the United States, while developing countries predominantly participate as users or service providers on these platforms (ILO, 2021). The proliferation of these platforms has also contributed to an expanding digital divide between different regions. This divide is further accentuated by the fact that 96% of investments in these platforms is concentrated in North America, Europe and Asia. Moreover, in 2019, approximately 70% of the revenues generated by digital labour platforms was concentrated in just two countries: the United States (49%) and China (22%) (ILO, 2021). This shows the disparities between countries in access to and benefits from the digital economy.

With their dominant position in cloud services, these multinational companies have easily penetrated developing country markets and shaped their infrastructure development. This trend is exemplified by taxi platforms such as Uber which operates in 69 countries, and Facebook (now Meta) which offers the Free Basics internet service while serving as both an e-commerce platform and social media platform (Malik, 2022). This concentration of power among a small number of platform companies poses significant challenges to developing countries as they shape their economies. For example, online microtask platforms, such as AMT, and multinational companies outsource data processing, clerical and low-end tasks that are used for training artificial intelligence to workers dispersed globally. While they provide income-generating opportunities, the nature of these tasks is often repetitive and low-skilled. In developing countries, where a significant proportion of the workforce operates in the informal economy, this trajectory of the digital economy has the potential to push highly skilled and educated workers into precarious or informal working conditions. This can exacerbate income inequalities both within and between countries.

For instance, according to the ILO global survey on microtask platforms, more than 60% of workers from developing countries possess university degrees. However, their hourly earnings are significantly low, averaging around US$2, which is nearly half of what workers from developed countries earn (Rani and Furrer, 2021). The discrepancy in earnings can be attributed to the nature of these tasks, as low-skilled and poorly paid tasks often tend to be outsourced to workers from developing countries, while better-paid tasks, such as content creation, are outsourced to workers from developed countries. Furthermore, the design features of platforms impose restrictions on workers from specific developing countries, which hinders their access to well-paid tasks. This contributes to not only the polarisation of jobs and incomes but also perpetuating discrimination based on factors such as gender, ethnicity and geographical location (ILO, 2021). Moreover, in the offline labour market, earnings are influenced by

education and experience, but there is no correlation between earnings and education or experience on platforms because they are similar and also stagnate over time. There is no guarantee for upward mobility or earning higher incomes with more experience (Rani and Furrer, 2019).

The emergence of these platforms also has the potential to exacerbate income inequalities within local labour markets. A comparative analysis of earnings in India unveils a significant wage disparity between online microtask workers and those employed in traditional firms performing similar tasks. Online workers earn 64% less than their counterparts in traditional firms. This disparity is even more pronounced among women workers, reaching 69% (ILO, 2021). Furthermore, as workers are often misclassified as independent contractors, they are deprived of work-related benefits such as paid leave and sick leave, social protection and pensions. This lack of access to crucial benefits further contributes to the income inequalities arising from platform work.

Inequality in earnings between countries is prevalent on freelance platforms as well. According to the ILO global survey on freelance platforms, the average hourly earnings for workers is US$7.6. However, workers from developing countries earn 60% less than their counterparts in developed countries, primarily due to client perceptions and platform design that hinder their access to well-paid tasks (Beerepoot and Lambregts, 2015; Galperin and Greppi, 2017; ILO, 2021). The global nature of online freelance platforms creates intense competition among workers for job opportunities. Furthermore, as ratings and reputation play a crucial role in securing work on these platforms, workers often adopt various strategies to increase their chances of getting tasks or being hired on projects. These strategies include subscribing to platform plans, paying fees to prioritise their proposals or bids, providing subsidised work (undertaking tasks without payment) or underbidding (Rani et al., 2023; ILO, 2021). This often leads to self-exploitation on the part of the workers, which further increases inequalities.

Platforms have also been seen as a potential solution to addressing existing gender inequalities and promoting women's economic empowerment in developing countries, where gender disparities in the labour market are prevalent (Rani et al., 2022a). However, it is important to note that platforms do not automatically eliminate gender inequalities, despite assumptions that they should be gender-neutral (Barzilay and Ben-David, 2017). Evidence suggests that there is a significant gender segregation of tasks on freelance platforms, with men dominating tasks related to technology, software development and data analysis, thus mirroring traditional labour market patterns (ILO, 2021; Shevchuk and Strebkov, 2021).

Gender disparities in hourly earnings on online labour platforms also exist. These differences are influenced by the nature of tasks and platform types (Aleksynska et al., 2021; Hermann et al., 2019; ILO, 2021). Some researchers argue that these disparities can be attributed to the gender segregation of tasks (Beerepoot and Lambregts, 2015; Chan and Wang, 2018). Despite women in both developing and developed countries performing the same tasks, significant inequities in earnings persist, with women in developing countries earning 50% less than their counterparts in developed countries (ILO, 2021). In addition, algorithmic management practices can penalise women and exacerbate their work and income insecurities. This occurs particularly when they are engaged in male-dominated occupations, such as the ride-hailing sector, as observed in Argentina and China (Kwan, 2022; Micha et

al., 2022). Consequently, algorithmic management practices disproportionately affect women workers and reinforce gender inequalities.

The polarisation of jobs and incomes observed within the realm of digital labour platforms is not a new phenomenon, but rather a continuation of a process that has been ongoing since the beginning of the ICT revolution. The outsourcing of manufacturing and service activities from advanced economies to the global South has been prevalent for some time, and has been driven by the allure of cost advantages. While these countries offer their labour at significantly lower rates, the prices of goods and services within their own borders often remain high. This situation perpetuates inequality within these countries, as the benefits of global outsourcing may not necessarily trickle down to the broader population.

Role of the developmental state in the development process

Since the 2008 global financial crisis, governments in developing countries have been faced with rising unemployment rates. They have embraced digital labour platforms as a potential solution to creating viable employment opportunities. In addition, in both middle- and low-income countries, where structural transformation has "failed" and where there is growing unemployment, including that of an educated workforce, these platforms have become attractive among policy makers. These platforms are often regarded as a "mantra" or "silver bullet" for employment creation and development (Heeks, 2017; Kuek et al., 2015; Schriner and Oerther, 2014) and for accelerating structural change (Matthess and Kunkel, 2020). This has led governments in many developing countries to invest in building digital infrastructure and formulating policies for digitalisation with the goals of accelerating structural change, creating employment opportunities and fostering development (Graham et al., 2017; Matthess and Kunkel, 2020; Rani and Singh, 2019).

Outsourcing work through online labour platforms has become an important aspect for firms in advanced economies as it reduces costs. These platforms are radically transforming the way enterprises conceive business, how they interact with one another and how they create value for society (Mazzucato, 2018). The implications of the ongoing platformisation of work for the development process of developing countries are multifaceted. The availability of cheap labour has attracted venture capital investment and investments from large tech companies and has led to the penetration of platforms in developing country markets. While this has led to some job creation, it is primarily concentrated in low-skilled and low-paid tasks that use highly educated workers. This could lead to limited skill development and could hinder the transition to higher skilled or value-added activities. Furthermore, the dependence on outsourcing presents vulnerabilities for developing countries. Their economies become highly reliant on the demand from the global North, making them susceptible to fluctuations and uncertainties in the availability of work.

This dependence on external demand for services is not new. Since the 1990s, many developing countries have been providing services to consumers, clients and firms in the global North markets through call centres, BPOs and contact centres. The highly educated workers in some of the technical fields in developing countries are today servicing the needs of firms and consumers in the global North. How can servicing the countries in the global North

bring about economic transformation or social transformation in developing countries? Surely, IT-enabled services have helped some of the local economies to develop their technical expertise and develop new technologies, but did they bring about a substantial change in their economies by using such technology to reduce drudgery? Some of the tasks being outsourced in the era of web 2.0 and digital economy through platforms raises significant questions about their relevance to the local economy and society, as well as the future career prospects of workers (Rani et al., 2023). Tasks such as promoting products or services, writing fake reviews, cleaning the web or engaging in academic writing may not contribute meaningfully to the local economy or facilitate productive structural transformation. Instead, the ongoing digitalisation process tends to precaritise highly educated workers, both in terms of the content of work and the conditions under which they work, thus creating a sweatshop of digital labour, especially in developing countries.

The concentration of wealth among a few tech and platform companies poses a formidable challenge to shaping the development of the digital economy and regulating it in developing countries. This concentration of power creates a dependency on these companies for digital infrastructure and services, limiting the ability of developing countries to enact effective digital regulations and foster their own digital industries. This hinders local innovation. Furthermore, the dominance of these platforms over financial and data resources stifles the emergence of alternative platform business models that align with the development priorities of developing countries and that promote fair working conditions.

It is therefore important for developing countries to regain control over the digital economy and shape it according to their specific development goals, rather than being subject to the interests of big tech companies. This calls for a thoughtful exploration of how emerging technologies can be harnessed to drive productive transformations, through leveraging a highly skilled and qualified workforce that contributes to economic development and enhances rankings on the human development index. By reclaiming agency in the digital economy, developing countries can forge a path towards inclusive and sustainable development, ensuring that the benefits of technological advancements are distributed equitably and contribute to long-term prosperity.

Harnessing technology for development and the protection of workers

How can technology contribute towards providing solutions to developing and low-income economies? The rise of information technology was presented as a tool for the growth of a "knowledge economy" in developing countries but has not lived up to this promise. Instead, it is deskilling workers and creating low-end service economies. While often associated principally with tech giants and the IT sector, a knowledge economy is also critical to traditional sectors such as manufacturing, mining, energy and agriculture. So, what then is meant by development of "knowledge" and relevant skills and capabilities in economies in order for countries to become so-called knowledge economies? There is a need for innovation in all these sectors. This requires developing knowledge that could be used to create tools, products and devices that can reduce drudgery and help improve the conditions of workers. This would require identifying sectors that have growth potential and developing relevant skills and knowledge that can enable developing economies to innovate and reap benefits.

Further, digital technologies can be effectively harnessed to provide decent work to platform workers instead of making them precarious. Digital technologies are already being used to promote formalisation through the registration of economic units and employment, digital payments or electronic payroll, the provision of social protection and other benefits, and filing and payment of taxes (Chacaltana et al., 2019). This strategy could be replicated and scaled up in a variety of different contexts, including platform work, so as to ensure decent work to all workers. Technologies can also help in increasing compliance through maintenance of digital records, which are transparent, and using targeted inspection and enforcement. Similarly, with increasing work intensification, working time can be digitally maintained to ensure protection of wages for hours worked, as well as to ensure compliance with working time regulations.

Thus, addressing the challenges in the digital economy requires a comprehensive approach that promotes skill development, encourages the growth of higher value-added activities, and ensures meaningful and productive work opportunities within the digital economy. It is essential to prioritise the creation of jobs that align with the long-term development goals of the country and that foster sustainable and inclusive growth, and to bring about more favourable labour and employment outcomes. By doing so, countries can navigate the digitalisation process in a way that benefits their economies and society, while safeguarding the labour and social rights as well as the well-being of workers.

Links between digital and structural transformations: an assessment and policy choices

The above review has illustrated that the "promise" of digital jobs as a step towards improved development outcomes in the global South is severely compromised. This is further evident in the poor quality of jobs being generated, low wages and lack of organisational power. Digital technologies are not being translated into decent employment or productive transformation in developing and low-income economies. We have also noted that the context for structural transformation differs dramatically from earlier periods, with a number of key economic shifts that have affected the possibilities for transformation – financialisation, global integration, capital concentration including platform monopolies, and the shift in "value" from goods to data products and intangible services. Returning to the key assumptions or "stylised facts" of structural transformation, we trace a number of ways in which these are challenged or disrupted by digitalisation in the current global and varied national contexts. We then explore alternative policy approaches to address the challenges.

Intersectoral change through shifts in relative prices: The intersectoral allocation of labour towards higher-productivity sectors is not a key feature of the current digital technological change. Indeed, we suggest that the digital economy does not represent a new "sector" in the conventional sense; rather, new technologies or digital tools are used to mediate employment in existing or "traditional" sectors. A key concern then is how to ensure that a growing "service" economy can provide a route to structural transformation and development for low-income and developing economies.

Increased productivity via intersectoral change and skills bias: The observed shift to services mediated by digital technologies (largely low value) is, in turn, not leading to higher productivity and rising wages, nor is it driving investments in education, skills and human capital. Instead, current evidence points to a decrease in labour share of value, lower wages, deskilling through taskification and erosion of human capital. Furthermore, returns in the digital economy accrue disproportionately to capital (specifically venture capital) and, relatedly, to new technologies in which it invests and controls – capital which is heavily concentrated in the global North. When benefits of increased productivity occur through technologies, they tend to accrue to workers who are higher in the value chain and who are largely based in advanced economies. Digitalisation is undoubtedly leading to changes in the organisation of work and production, but in a way that – in the absence of appropriate global or national regulation for the networked economy – is in many instances reducing the terms and conditions for many workers, their skill development and career pathways, and their power to organise.

Productivity and sectoral change shift the pattern of demand and consumption in the economy: Changes in demand which could stimulate new drivers of growth and contribute to individual and societal well-being are undermined by the lack of increase in productivity or returns to labour. The increasingly precarious nature of digital jobs and work conditions reduces the possibilities of a shift in consumption and increased demand that would support economic and social development.

Capital (and technology) flows to where it receives highest returns: The ability of developing countries to attract private or foreign capital and technology, based on comparative advantage as a route to development in the absence of significant state investment, has been widely questioned. Evidence points to a reduced (and often negative) FDI flow towards countries in the global South. Digitalisation facilitates the process of concentration of technologies in the global North, and the extraction of value from low labour cost locations by multinational firms. These firms are able to take advantage of a global "reserve army" of labour and to evade regulation and taxation by countries in the global South. Profits are expatriated and capital flight reduces resources available to national governments at the same time that governments are being called on to invest in infrastructure to incentivise investment. This concentration also creates disincentives to technology transfer, further disadvantaging low-income and developing economies.

Conditions of work and returns to skills: The assumed transition to "decent" jobs and "formal" working or employment relationships and other institutional arrangements, including access to social security, has stalled or is being reversed by practices made possible by algorithmic management and digital Taylorism. These practices include the misclassification of workers as "self-employed", zero-hour contracts, the passing of risks onto workers (for example, capital investment, irregular work) and increased precarity in the name of flexibility. Furthermore, there are also significant concerns about deskilling of work and workers who are performing highly professional work such as translation and copy-editing. In addition, there are also concerns about the disconnect between the levels of education and experience of workers on these platforms and their earnings. The opportunities for career development are quite limited.

An additional distinctive feature specific to the current digital transformation is the **value attached to data** and the difficulty of assigning value or measuring "added value" of the intangible goods and services produced using such data. This may, for example, be data extracted from workers using apps in their own time in order to get "jobs", from the "gamification" of their work, from consumers using digital services, and from low-paid crowd-sourced work that contributes to AI (Perrigo, 2023). While the "owners" of data rights can potentially realise high returns, for countries in the global South this can be experienced as another form of resource extraction or "data colonialism".

Overall, a range of critical assumptions underpinning past structural transformations and pathways via better employment to development do not hold for the current phase of digital "transformation". As Matthess and Kunkel (2020: 10) also found, the benefits of digitalisation accrue mainly to developed countries, given higher endowments of "high-skilled labour, capital and intangible assets whose productivity increases relatively more than for land, low-skilled labour energy and material"; "relative wages of unskilled workers are affected negatively and employment intensity of trade decreases"; power relations in global value chains (GVCs) mean technology-leaders backed by financial capital can "cherry pick" high value-added tasks/production stages. They conclude: "In the wake of digitalisation it is increasingly debated whether developing countries can achieve economic prosperity through industrialisation in the same manner as developed countries did". Instead, rather than catching up, we may be seeing divergence in growth trajectories, and a deepening "digital divide" that exacerbates existing inequalities and widens income gaps within and between countries (UNCTAD, 2019).

We have also argued that, while technology is driving a digital transformation which is changing the organisation of work, technology does not determine the relations of production. Technology may drive intra-sectoral changes in productivity, but broader transformations in, for example, the social relations of production, ownership of capital, power and institutions, are driven by social and political forces as much as by changing technologies. In this sense, the digital economy is not so much a productive sector but rather a "tool" that is transforming the operation of economy and society. These broader economic and socio-political processes are often ignored by "techno-optimists" who emphasise the opportunities for leapfrogging, job creation and increased incomes to reduce poverty and spur "development" (Schriner and Oerther, 2014).

At the same time, there is some room for optimism: digital technologies can make important contributions to productivity and development across a range of sectors within the "traditional economy", including in agriculture, the provision of social goods and services, and in enhancing skills and human capital. Among other things, digital technologies reduce transaction costs and information asymmetries, and enable network effects. These advantages can be used in areas of health and education by expanding access to populations in remote regions or innovating methods of service provision. Likewise, in the agricultural sector and rural economy, digital technologies enable stronger connections with markets and information flows create new opportunities to enhance productivity and rural livelihoods. State policies are required, however, to capitalise on the potential demand for and contributions of such technologies. So, for a technologically driven change in economic structure to be transformative in productive or developmental terms, other economic, social and political conditions and policies are needed. As

Carlota Perez persuasively argues, what is required is "technologies that are technologically feasible, socially and politically acceptable, and economically profitable".[11] In particular, it would be important to ensure that a larger section of the population reaps the benefits of such technologies and transformations, shares in the value and that the state benefits from growth and has capabilities and resources to ensure a more equitable distribution of the benefits.

What can be done?

So what macro and sectoral policies (industrial, employment, social or other) are needed to create jobs and address structural inequalities in the context of digital transformations and to ensure that services can provide a route to development for "labour surplus" developing economies? What power and capabilities do states need, and what other institutions and capabilities are required for a productive digital transformation, to ensure capital is accountable and to support labour? How can states attract adequate resources for long-term ("patient") investment in infrastructure and skills and how can they ensure that the benefits are retained in the country, whether through wages/returns to labour, or corporate taxation and other capital contributions such as to social security? What kind of regulations are needed to make the digital economy equitable, sustainable and just? We present some ideas relating to key policy domains, while also addressing the question of how digital technology can be deployed and used to bring about more favourable labour and employment outcomes, pathways to security and development in developing economies.

Macro and sectoral policies

Under current conditions of a globally integrated and financialised economy, investing in digital infrastructure and technologies, and developing the wider innovation ecosystem which includes improvement in education, is critical if developing economies are not to be left further behind. Policies that create more favourable conditions for firms (particularly small, informal and labour-intensive enterprises) can support the creation of productive and decent jobs. Current macro and industrial policies, however, appear inadequate when faced with the highly concentrated nature of platform capital and global competition for low-cost labour.

Supply side policies aimed at macroeconomic stability, increasing efficiency in the production of goods and services, and improving the climate for investment and doing business have not generally led to growth in developing economies (Ocampo, 2003). Nor have they led to the anticipated technology transfer, job creation or demand-side impacts on consumption. Countries compete for FDI often through deregulation (including that of labour) and the provision of incentives (or reduction of risk) to capital through lower taxation or subsidies. Furthermore, recurrent global economic and financial crises have led to widespread imposition of "austerity" policies that constrain options for development, undermine social gains and reduce the ability of governments to invest in essential public goods and services (Ortiz and Cummins, 2022).

[11] See lecture by Carlota Perez [https://www.youtube.com/watch?v=D0h1GC2z1rk] accessed [December 19, 2022].

Demand side policies, on the other hand, prioritise the increase in domestic demand and consumption as a driver of growth and development. These could include a broad spectrum of policies such as active labour market policies involving job creation, skills and training, labour standards and protections, social protection and investment in essential goods and services. The OECD (2011) points to a range of available mechanisms, such as public procurement, regulations and standards mechanisms, which governments can use to promote demand for innovation and use of technologies in ways that support jobs and welfare, and which benefit the public good.

Selective industrial policies are also essential for directing domestic investment to help develop appropriate digital infrastructure and industries in ways that also support public goods and development. To ensure benefits do not accrue predominantly to private capital, states will need to work with business, putting regulations in place or directing public finance, not just to incentivise private investment, but more importantly to ensure capital is directed to sectors that can be both productive and welfare-generating. As Mazzucato (2018) has argued, the state must take on a vision with longer time horizons than capital – illustrated by the experience of earlier developmental states but particularly important in this current phase of financialised "Casino finance". The state must play a role in setting directions, creating confidence, reducing uncertainty and supporting strategic industries.

Furthermore, in the contemporary context, developmental or entrepreneurial state policies will be needed to direct finance towards a development strategy that is also "green" and sustainable. Digital infrastructure and technologies must be an essential part of any industrial policy for a low-carbon transition; they can play an important role in dematerialising the economy. At the same time, digital transformation is not necessarily low carbon, and digital jobs are not necessarily "green" jobs. Many low-income and developing countries have key mineral resources and potential production capabilities for claiming more added value through essential material production (mobile phones, etc.). Development of circular economy production and reuse processes will be essential to minimising carbon emissions in production and waste disposal associated with any digital transformation. As Perez notes "green is not a revolution but the full deployment of IT revolution through all sectors of economy…".[12] The climate crisis also makes clear that uneven geographies and entrenched inequalities will require solutions at a supranational or global level: the funding of infrastructure in more remote or disadvantaged regions, the provision of global public goods and a regulatory environment that overcomes pre-existing disadvantages will require multilateral, regional and global solutions and finance.

Regulation and institutions

Governments around the world and global governance institutions are challenged by the speed of change and nature of digital technologies. They have fallen behind in finding ways to regulate digital companies and new technologies, and to adjust to the scale and use of data. These challenges inevitably place lower-income states at a greater disadvantage. Rapid scalability and network effects make it hard for "late-comers" to break into existing markets.

[12] See lecture by Carlota Perez [https://www.youtube.com/watch?v=D0h1GC2z1rk] accessed [December 19, 2022].

While solutions are not easy, here we note some areas where regulation must focus on supporting a productive transformation and areas where global coordination and standards are needed.

Labour regulation – classification of workers and labour protection

A fundamental issue for many platform or "gig" workers is their classification as self-employed or independent contractors, which excludes them from labour rights and protections. Judicial decisions have been made in a number of high-profile cases where global companies are deemed to have evaded responsibilities to workers. Various approaches can be identified to ensure access to employment rights reflected in these decisions: first, platforms may be required to consider workers as employees subject to full labour rights and protection; second, platform workers may be incorporated in existing labour and social protection regimes, regardless of their classification; third, an alternative category of workers may be created with rights to certain labour and social protection benefits under existing legislation. A related approach has been to regulate platforms, including relations with clients and workers, pricing and fees, use of data, etc. but not necessarily including access to labour protections. Finally, there is a need for global regulatory frameworks for online web-based platforms which operate across multiple jurisdictions to ensure that the workers are protected because platforms, clients and workers are located in different jurisdictions.

Regulating enterprises – taxation and accountability

Large platform companies have the power to make rules and shape market dynamics. This makes obvious the need for anti-trust regulation or measures to enable fair conditions for market entry of local capital, and ensures that multinational capital reinvests and contributes to national development. Deregulation has been a major feature of arguments for attracting foreign investment with the promise of job creation, facilitating poor working conditions, extracting value and repatriating profits.

Furthermore, digital labour platforms avoid sector-specific regulations by classifying themselves as tech companies, which also has an impact on taxation (Martens, 2016). Promising examples exist of countries starting to bring platforms under the regulation of relevant sectors, such as e-hailing platforms under transport sector regulations. In addition, as platforms rely heavily on intangible assets, such as software and algorithms, they can readily access global markets and change their location and jurisdiction, which creates challenges for state taxation and regulation (ILO, 2021).

Regulations and the capacity of states to enforce such regulations is needed in order to hold capital to account, guarantee better working conditions (wages and hours) and enable worker organisations to address the loss of worker control through "algorithmic management", among other issues. In addition, a stronger global regulatory framework will be required for digital taxation across jurisdictions, while mechanisms must also be created to ensure that all states – and particularly those with fewer resources or capabilities – have the capacity to tax corporations and to implement and enforce regulations (ILO, 2021; OECD, 2014).

Social protection and social reproduction

In the absence of adequate labour protection, the state is expected to not only undertake investments to attract and facilitate digital capital, but also act as a social welfare provider of last resort through the provision of minimal social assistance schemes for vulnerable populations, including many of those working in digital jobs. Given increasing evidence of a growing precarious labour force, arguments are growing for Universal Basic Income (UBI) or other "basic income" schemes to extend state-financed social protection to the working poor. While such approaches may indeed be part of a solution, in contexts of high informality and un/under-employment, and where macro policies emphasise budgetary austerity, funding such schemes is a major challenge. Digital firms must be a source of both decent work and state revenues, and a source of finance for social protection and reproduction. State regulation must thus evolve the capabilities to hold digital capital to account, ensuring that firms take on the true cost of labour while providing revenues for productive investments and social reproduction.

Data transparency and protection

Platforms collect user data on a continuous basis, with exclusive ownership and control over the data. This inevitably leads to an imbalance in power between capital and labour. While data has become a strategic economic resource for companies because it can be monetised, at the same time personal data can be used to monitor workers or be used in other ways which may adversely affect them. Workers should have access to data they produce, so that they can leverage their own data to engage in collective action and collective bargaining (Baiocco et al., 2022; ILO, 2021). In addition, as worker data encompasses different stages of data value chains (collection, analyses and inference, storage, etc.), the data rights should be attached to all these different stages, with clarity on who has access and how access to data should be regulated (Baiocco et al., 2022). Data protection laws should apply to all workers, irrespective of their employment status. This would give them more control over their data and "individual rights of access, deletion, portability and more" (ILO, 2021: 254).

Going beyond individual rights over data, it would also be important to look at how data could be used for economic or societal development. While there is some thinking around collective user rights over community data, there is a need to develop a framework for regulating such user rights. This would require companies and platforms to share data and would be subject to a license for using data (Baiocco et al., 2022). This strategy would particularly benefit developing countries as it would allow them to develop a public data infrastructure, which could contribute to empowering platform workers and improving their lives (ILO, 2021). In addition to bringing "data" into "labour regulations" and "labour rights", there is also a need to sensitise and create awareness about the importance of data among trade unions and workers' collective organisations.

Finally, platforms should be transparent and share data with public authorities about the number of workers regularly using their platforms and the incomes earned by workers. For instance, sharing workers' income with tax authorities would ensure that tax payments were made, and that the share of social security contributions were transferred to the respective institutions.

Unionisation and collective bargaining

Workers who are classified as employees enjoy employment protection and have the right to unionise and bargain collectively. These are enabling rights. However, when workers in the digital labour platforms are misclassified as "self-employed" or "independent contractors", they do not enjoy rights to unionise or to collectively bargain. As the terms of service agreements of the platforms are "contracts of adhesion", platforms can deactivate workers' accounts without providing a reason or justification and workers generally have no recourse to challenge such decisions (ILO, 2021). While there have been widespread assumptions about legal and practical difficulties in organising and coordinating group actions of platform workers, such as protests or demonstrations (Johnston and Land-Kazlauskas, 2018; Vandaele, 2018), recent years have seen an increasing number of such actions around the globe aimed at improving working conditions, especially on location-based platforms (Bessa et al., 2022; ILO, 2021). Workers without the "right" to unionise have been able to increase their associational power using technology and communication networks (ILO, 2021; Webster et al., 2021). However, the difficulties and challenges of organising workers on online platforms are real, because workers operate across different jurisdictions but also because workers compete with each other for jobs.

Most of the coordinated actions in support of platform worker rights and conditions have been led by informal worker associations which have coordinated with formal unions in certain instances. Trade unions have also helped associations of platform workers with legal challenges, but there is much more that needs to be done to ensure that platform workers are protected. Innovative ways of integrating such associations into unions and alternative mechanisms of ensuring protection exist and can be learnt (Webster et al., 2021). Further, it is important that legislative frameworks guarantee all workers the right to organise and bargain collectively on platforms. This would ensure that workers can negotiate on issues such as terms of engagement on platforms, rules about commission fees, ratings and deactivation, pricing, use of data and evaluation systems.

Conclusion

By way of conclusion, we return to our initial focus on labour and employment, which reflects a concern with conditions of work and welfare of workers and their families, and with employment as a key determinant of "development" or economic and social progress broadly construed. In current contexts of excessive levels of inequality and unemployment, the questions of Seers (1969: 2) still seem relevant. "The questions to ask about a country's development are therefore: What has been happening to poverty? What has been happening to unemployment? What has been happening to inequality? … If one or two of these central problems have been growing worse, especially if all three have, it would be strange to call the result "development", even if per capita income doubled."

From our analysis, the evidence is clear that, to date, digital transformations have not led to sectoral shifts associated with structural transformations in low-income and developing economies; nor are they creating sufficient new, "decent" and productive employment necessary to drive such shifts. Consequently, un/under-employment and underlying structural inequalities are not being addressed. Our review of diverse literatures relating to structural and

digital transformations has highlighted several key elements of the current digitalisation process, as well as features of the wider environment, that obstruct productive and welfare-enhancing development. We have also pointed towards the kinds of policy that would be needed to support developmental transformations while noting some opportunities for using digital technologies to resolve issues related to workers' rights, access to benefits and conditions of work.

The key question then becomes how to bring about necessary policy change. Further research can undoubtedly contribute to understanding the possibilities and making the case for necessary changes. Several areas where a deeper understanding or elaboration may be useful include the rethinking of core concepts that are challenged by the intangible value ascribed to data in the digital economy: what does productivity mean, what is the source of value and how should work be rewarded? A deeper understanding of where value is generated and where such value is claimed, for whom, at different stages of digital value chains and across different sectors and industries could illuminate the ways new technologies are increasing rather than reducing group and spatial inequalities. A policy focus on supporting the use of digital technologies in sectors where lower-income or subsistence workers may be concentrated, such as agriculture, may conversely enable benefits to be shared more equitably. Guiding capital towards long-term investments in such sectors, rather than to those where venture capital looks for short-term rewards, will be needed for more equitable outcomes. Rethinking the links between skills, productivity and wages, including understanding how to use an educated or skilled workforce productively, will be critical, not only for the workers involved, but also for creating an environment in which learning about, and the adoption and diffusion of, technologies can enhance economic productivity overall.

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