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Labour agency in the future of work: Shenzhen's maker community

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Abstract

Since emerging around 2010, maker culture and the maker movement have drawn little attention from digital labour research. This article fills the gap by exploring sociocultural dynamics that have emerged in maker culture, such as how makers in China mobilise their agency to struggle for a path forward to achieve decent work and a better society. The article first reviews research on the Chinese maker community as well as digital labour, in particular the dualism of exploitation and workplace resistance in current digital labour research. It argues that makers, in the case studied, mobilise certain agency initiating from sociocultural dynamics beyond the framework of exploitation. The article then explicates the argument with cases collected from our fieldwork in Shenzhen's maker community in July–August 2017. It shows makers' practices originating from the open-source ethos, such as an awareness of sharing and mutual support in moulding a 'micro-innovation' model, and in creating products that aim to benefit vulnerable communities and build up a sustainable ecosystem. The article thus turns the current economic discussion on maker culture in a new direction: the sociocultural impact of the maker movement. Furthermore, it suggests that this research on the sociocultural impact fills the gap between existing digital labour research and maker studies.

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Introduction

Research has indicated that during the global pandemic outbreak, maker communities played a positive role in the fight against the COVID-19 pandemic, through mutual support in using digital fabrication tools for the DIY (do it yourself) production of items in short supply, including ventilators (Abbassi et al., 2021; Corsini et al., 2021). Although the maker movement has been suspended for a while, after *Maker Media*, the company behind a DIY magazine *Make Magazine* and an art-science festival *Maker Faire*, went bankrupt in June 2019 (Constine, 2019), China's 'Made in China 2025' (MIC2025) policy is still in play to channel state-led funding into the Hi-tech sector, including maker spaces (The Economist, 2021). At the time of writing (September 2021), there were 248 maker fairs in 45 countries across the globe (Wood, 2021).

The term 'makers' refers to a global community of designers, artists, programmers, hackers, engineers and craftspeople. This community is sometimes narrowed down to people who approach things in novel and technical ways. For example, Anderson (2012) defines makers as a group of people making individual manufacturing products using the internet and the newest industrial technologies. Likewise, maker spaces are widely seen to provide access to tools and resources to experiment, learn, repurpose and create unique products and services through hands-on involvement in either self-directed or collaborative design and digital fabrication projects. Rosa et al. (2017) define fablabs, hackerspaces and maker spaces as the main representations of the maker movement. They trace the origin of the maker movement to the 1970s counterculture, with an emphasis on technologies, a DIY enthusiasm and an open-source paradigm. Doussard et al. (2018) highlight the importance of the internet within the maker movement, as it provides knowledge and social connections within the communities. Digital technology then becomes a key term within maker communities and movements. However, research on maker culture and the maker movement rarely raises the question of labour, not to mention the digital labour. By coincidence, research on the maker movement and platform labour intersects at the exploration of the future of work in recent years (Berg et al., 2019; Rosa et al., 2018). Therefore, it is necessary to address the maker research within the wide spectrum of digital labour research.

The concept of digital labour has been widely prevalent as an established basis for critique. A number of important themes and concepts, such as immaterial labour, affective labour and precarious labour, have recurred in recent studies of digital labour (Gandini, 2021; Hardt and Negri 2000, 2005; Standing, 2011; Terranova, 2004). The critique has diverse ideological and theoretical foundations spanning Marxism, Weberian and neoliberalism. These foundations rest on normative principles such as those related to neocolonialism, social justice and inequality. Digital labour research has ultimately turned to solutions for a range of economic and social problems, such as underpayment, unemployment, uncertainty and sluggish social development, by uniting either 'the middle class facing the problem of proletarianisation' or the precarity, to resist capitalist exploitation (Graham et al., 2017; Schmidt, 2017; Scholz, 2014). However, in certain ways, the critique may have become rather familiar and stale. Digital labour response towards sociocultural dynamics in the global south – the maker community used as an example in my research – may contribute to a different path forward for a decent work and a better society.

Some interconnected contributing elements to Chinese maker spaces, such as decentralising technologies, lowering the barriers to entry into production infrastructure and supply chains (Anderson, 2012; Doussard et al., 2018; Rosa et al., 2018) and challenging the status quo by way of subverting perceived dominant copyright regimes (Stangler and Maxwell, 2012), demonstrate such sociocultural dynamics. Rosa et al. (2018) argue that the maker movement will change or re-enact lost meanings of work. Some of its fundamental values, such as collaboration, openness and sharing, are seen as drivers of the futures of work. Therefore, my research further explores such sociocultural dynamics, with a research question of how makers in China mobilise their agency to struggle for a path forward on decent work and a better society.

Research on maker community and digital labour

The global and Chinese maker communities

Anderson (2012) categorises makers in the globe into three categories: '0 to 1 makers' – those who create products with original innovation; 'makers to makers' – those who create products by cooperating with others and 'makers to market' – those who aim to commercialise their work. On a global scale, Anderson argues that all the three categories of makers constitute a pyramid, with '0 to 1 makers' at the bottom. By agreeing with Anderson's categorisation of makers, Wen (2017) argues that the Chinese case shows an opposite pattern, with 'makers to market' occupying the largest segment of maker communities. She argues that open source is the key to 'tackling social inequality by providing opportunities for accessing tools and knowledge for residents, especially the young and disadvantaged' (p. 346). However, this open-source ethic obviously challenges intellectual property (IP) laws, which protect individual intellectual work. Tensions between the maker community and copyright holders have become a major concern in the existing research on China's maker community.

The *New Shanzhai* model is a good example of the research tendency. Commentators have noted that as the manufacturing capital of the world, China has developed over the last 30 years an open, low-cost production, network model that mirrors some overriding principles of the maker movement (Fallows, 2016; Lindtner and Li, 2012). David Li has termed it as a *New Shanzhai* (from the Chinese word for 'copycat') that taps into free, informal and open-source systems and infrastructures involving hardware, electronics, new forms of manufacturing and information sharing. The *New Shanzhai* ecosystem is characterised by four key factors, namely (a) speed of innovation, (b) a disregard for IP protection, (c) a dense network of communities of makers, entrepreneurs and other stakeholders and (d) institutional support (Mengoni, 2015; Thompson, 2015).

The need to respond to niche market demands not catered to by big businesses has significantly boosted the ability to make prototypes quickly and to assemble components as swiftly as possible in different configurations, something that demonstrates an almost instant provision of innovative solutions (Mengoni, 2016). This approach, coupled with 'weaker IP protection [where it exists] and cut-throat competition', means that '[makers] and entrepreneurs place less emphasis on protecting their inventions in China, instead attempting to innovate quicker than their competitors' (Saunders and Kingsley, 2016: 8). Key competitive advantages include familiarity with local tastes as well as proximity to

the world's fastest growing markets in India and Southeast Asia (Thompson, 2015). A further crucial competitive advantage is the ability to tap into large networks of stakeholders embracing an open, experimental manufacturing culture (Lindtner et al., 2015) increasingly supported by policy initiatives and subsidy schemes in line with the ambition to foster innovation-led economic development geared towards a 'Designed in China' status (Saunders and Kingsley, 2016: 8).

These developments have significant implications. First, grassroots innovation, design and digital fabrication in China are increasingly being (mis)understood as inherently business-orientated – a criterion used to allocate public subsidy (Saunders and Kingsley, 2016). Second, the reliance on funding from government, institutions and local manufacturers raises the question whether top–down support can potentially clash with the ethos of maker culture (Cerini, 2015). Third, the state of flux of grassroots innovation and digital fabrication 'has produced manic and fierce competition among swarms of entrepreneurs' (Thompson, 2015).

However, there is a danger of overemphasising the economic issues within maker movement and maker culture, as maker movement in the global context now has economically declined. Therefore, some maker research turns to explore maker education (Lin et al., 2020; Schad and Jones 2019), gender issues in maker culture (Eckhardt et al., 2021), makers' innovative solutions to the global pandemic (Abbassi et al., 2021; Corsini et al., 2021) and maker movement leading up towards a different future of work (Rosa et al., 2018). This research follows the new tendency to explore how the Chinese makers envision the future of innovation may change the shape of the business-oriented maker culture within the wide spectrum of digital labour research.

Digital labour research

Digital labour research has its history on two directions. One focuses on professional labour (Gill, 2002; Hesmondhalgh, 2010; Kennedy, 2012; Ross, 2012; Xia, 2014) and the other explores audience-labour (Barbrook, 2005; Fuchs, 2015; Jenkins, 2006). Fuchs and Sandoval (2014: 263–264) recognise that information and communication technologies) today create a plenitude of exploited labour, including mineral workers in Africa that contribute to producing hardware, industrial workers in China who assemble hardware tools, as well as low-paid software engineers in developing countries.

Indeed, the discussion on audience-labour originates in Smythe's (1977) theory on audience commodity. The work on free labour and immaterial labour by the Italian Autonomist Marxists, such as Hardt and Negri (2000, 2005), can possibly be seen as the antecedents to the concept. In the mid-2000s, the concept appeared in Barbrook's (2005) discussion of the gift economy and Terranova's (2004) development of free labour theory. Both formally include audiences in their examination of digital labour.

More recently, researchers such as Graham et al. (2017) have developed the theorisation of audience-labour by focusing on digital labour working on platforms that support transnational workflows. International Labour Organization drew attention to the platform labour with a report on its working conditions in 2018. Then, how platforms in the global south have worked and how these platforms monitor and constrain the digital

labour have become the recent tendency (Anwar and Graham, 2020; Heeks et al., 2020; Rani and Furrer, 2021).

In comparison, the discussion on professional digital labour centres on the concepts of the creative class (Florida, 2002), knowledge labour (McKercher and Mosco, 2008) and creative labour (Hesmondhalgh, 2010). The key debate between Hesmondhalgh and Mosco is over how to define and distinguish between cultural and information work. McKercher and Mosco (2008: 25) define knowledge labour as 'all people involved in the production and circulation of knowledge products'. To take the publishing industry as an example, knowledge labour includes not only writers, but also librarians and printers. In contrast, Hesmondhalgh defines creative labour as a group of workers dealing with the production and circulation of texts. The scope of creative labour is narrow, as Hesmondhalgh believes a generalised definition of knowledge labour eliminates the specificity and diversity of cultural and media work. McRobbie (2016) has been committed to criticising the phenomenon of 'self-exploitation', which manages the creative workers by authorising a certain degree of creative autonomy, in the fashion magazine industry.

Hesmondhalgh (2010) questions the extent to which the existing pairing of the concept of free labour with exploitation is coherent – is capital accumulation based on internet users' free time and data really the most important concern in digital labour research? Banks (2007) appreciates the work on 'self-exploitation' (such as McRobbie, 2016) that the creative management combined with the authorising of certain autonomy to workers' aims to 'override any misgivings, constraints or disadvantages that might emerge in the everyday reproduction of this highly competitive and uncertain domain' (p. 55). However, he also argues that the work is problematic: by understanding autonomy and creativity as a seduction from the state and firms, it ignores the agency and subjectivity of cultural workers.

Labour agency

Human agency has its philosophical origin in Althusser and Thompson's work. Callinicos (2004) quotes Perry Anderson's work to divide the intentional behaviour of human beings into three forms: acts towards 'the pursuit of private goals' (p. 1); behaviour that 'operate(s) within the framework of existing social relations, pertaining to the kind of ventures involving public goals' (p. 2) and acts involved in 'the collective pursuit of global social transformation' (Callinicos, 2004). Sociology studies later specify human agency in the labour process as labour agency. For example, O'Doherty and Willmott (2001) introduce three tendencies of exploring agency in labour process theory: the orthodox school, which, according to O'Doherty and Willmott (2001), overemphasises the economistic and structuralist issues of Marx's labour process theory by neglecting labour's subjectivity; the anti-realist approach, which abandons analysis of subjective/objective or structure/agency and the post-structuralist approach, which offers a critical way to understand the social formation of subjectivity. O'Doherty and Willmott (2001) prefer the post-structuralist approach as it helps them to understand 'how subjectivity is co-implicated in the accomplishment and reproduction of capitalist employment relations' (p. 457).

The post-structuralist approach is valuable in terms of realising workers' subjectivity and agency, but such arguments, with the 'second wave' labour process theory as a representative, are associated with a 'control, resistance and consent' model overemphasising some informal and subtle practices, such as effort bargaining, absenteeism and sabotage (Thompson, 2016). Moreover, the argument that 'resistance is everywhere, everybody, and everything' (Thompson, 2016: 110) indicates a Western-centric approach that incorporates workers' struggles against unequal working conditions into 'the bourgeois humanist fantasy of the autonomous subject' (p. 111). In other words, there is a danger that workers in Indian call centres and in Chinese Apple factories are ignored in this discussion on worker agency.

Hodson (2001: 16) defines agency as 'the active and creative performance of assigned roles in ways that give meaning and content to those roles beyond what is institutionally scripted'. He further divides worker agency into four categories of behaviour, 'resistance, citizenship, the pursuit of meaning, and social relations at work' (p. 17). Workplace resistance is the subtle and subdued practice that is actively and passively enacted by workers against unequal 'abuse, overtime and exploitation' (Hodson, 2001). The acts of workplace resistance in particular contribute to the understanding of labour agency in cultural industries as they supports workers' own existence, such as improving their own working conditions. Thompson and Newsome (2016) appreciate Hodson's framework of work dignity as an entry point for understanding labour agency in workplace.

Ackroyd and Thompson (2016) further point out that the Foucauldian framework, such as the argument that 'resistance is everywhere', dominated the labour agency research in the early 2000s. However, more radical scholars question to what extent such labour agency can work, as it gets lost in discourses easily. Though they recognise that Fleming and Spicer's work on cynicism and detachment is likely to have links to the growth of dissent, they still deny the possibility that such micro and subtle resistance will initiate collective struggles surrounding the workplace. They remind us to clarify 'the new repertoires of opposition at work', as the boundaries between work and life are blurring. In other words, we need to recognise new opportunities for collective organisation and action.

Therefore, this article asks how digital labour, the makers in my case, mobilise certain agency initiating from sociocultural dynamics to find dignity in work and further to envision a better society.

Research methods

The fieldwork was conducted by Dr. Daniel Mutibwa and me in 2017. However, he was unable to join the writing process of this paper owing to the serious impact of COVID-19 on the UK at the time of writing. Therefore, I explain our fieldwork details here by referring to him as well. We explored individual makers' subjective experiences by selecting a relatively wide spectrum of sites based in Shenzhen, including HAX, X. Factory, SEG Maker, Shenzhen DIY (SZDIY), Simply Work, etc. Access to these sites was initially negotiated either during the Hello Shenzhen Initiative networking events throughout March 2017 both in the UK and Shenzhen[1] or directly following desk research. In both the cases, we developed rapport and built trust and confidence that were instrumental in helping us establish fairly deep connections and working relationships that significantly facilitated our immersion into the everyday practices and processes of making crucial to our ethnographic enquiry (Hammersley and Atkinson, 1995).

Table 1. Details of the interview participants.

Numbers	Interviewees	Profession/status	Company/space
1	Abed Bukhari	Computer engineer	Admin Team/Litchee Lab
2	Alex	Freelance maker	X. Factory
3	Dale	Science teacher/member	An elementary school/SZDIY
4	Eddie, Anthony and Jenny	Teenage makers, 'Maker Mum'	X. Factory
5	Hao	Lecturer	Shenzhen University
6	Inder Sachdev	Industrial designer	HAX
7	Jacob	Freelance maker	X. Factory
8	Jay Yang	Operations manager	SEG Maker
9	JF	Teenage maker	X. Factory
10	Kim Pen	Mechanical engineer	Founder/Workshop
11	Lance	Freelance maker	X. Factory
12	Lei Ray Xun	Branding director	(Formerly of) Simply Work
13	Simon	Engineer/member	Firm Tech/SZDIY
14	Vicky Xie	Global corporation director	Shenzhen Open Innovation Lab (SZOIL)
15	Violet Su	Community manager	X. Factory
16	Wu	Entrepreneur	Stary Board
17	Zona Liu	Business development director	HAX

Source: Names are pseudonyms.

Access was renegotiated iteratively to adapt to prevailing and unfolding circumstances, something that was crucial in enabling us to learn about and experience unexpected activities and events that characterise the bustling maker scene. To incentivise participation at the sites we spent the most time (i.e. HAX and X. Factory),[2] we contributed membership fees towards the upkeep of facilities and resources in return for the opportunity to embed ourselves in the respective site cultures as (participant) observers. Overall, we conducted 51 semi-structured interviews and 6 focus groups. Here, I only pick 16 interviews and 1 focus group that are most related to this paper. Details of our interviews are shown in Table 1:

Additionally, we benefited substantially from the many informal conversations we had with a large number of maker stakeholders – both local and foreign. This approach not only helped to generate rich and holistic data from different angles, but also ensured that we obtained a full picture in response to the research aims and questions we outlined earlier. Overall, our core fieldwork activities in Shenzhen took place between July and August 2017.

The micro-innovation initiating from the open-source ethos

Iinuma (2000: 72–73) traces Japan's changing tendency from imitation with the form of importing technology to creativity with the form of exporting its own technology.

He further concludes that Japan only had steadily gotten rid of imitation until 1990s when its rate of importing technology equalled to that of exporting technology. Likewise, as stated in Section 2, *New Shanzhai* is a typical concept to describe the process, in which China seems to be moving from imitation to innovation. Some interviewees believe that China is in the mixed stage of imitation and innovation, and regard factors like government policies and market needs as the main stimulation. Some interviewees indeed name this mixed stage *micro-innovation* and specify what it means in Shenzhen's maker communities:

> *Shenzhen now has a very famous robot enterprise, UBTECH. . .This company localised steering gear . . . At that time, Japan's high-end steering gear from Japan was very expensive, about 2,000 to 3,000 RMB, and a robot would use about 15 to 20 steering gear, which meant that the cost of the steering gear alone would be 50,000 or 60, 000 RMB . . . The boss of UBTECH was so persistent that he invested tens of millions of dollars in the development of the steering gear and eventually reduced the cost of the steering gear to 100 RMB. This is also a kind of innovation. . .* (Interview 2)

Yang et al. (2016: 413) take China's largest instant messaging provider WeChat as an example to define micro-innovation as a short and repetitive cycle with subtle and adaptive innovation. They claim that WeChat practices micro-innovation by removing some redundant features to make it more user friendly, rather than adding new features. This exactly implies what Alex states. And interviewee Kim concludes that makers understand micro-innovation as a way to 'improve what is existing' or to 'make it better' (Interview 10).

The micro-innovation practices, aiming to reduce costs, are opposed to the copyright system in some ways. Ren (2016) points out that China's long history of copying official systems of cultural and knowledge creation to internalise the Confucian texts among scholars certainly cultivates Chinese individuals to regard creative work as collective rather than individual. He argues that copyright practices in modern China have not prioritised individual creativity. Copyright infringement and piracy consumption are thus recognised as 'cultural resistances against the monopoly of knowledge by enterprises and content censorship by the government in China' (p. 321). In contrast to the western context, maker culture in China is sustained by the mode of 'low-cost production through the open-source sharing of resources and ideas within a network of hardware manufacturers' (p. 20). In other words, micro-innovation in maker community here, sustained by the open-source ethos, is an alternative to or even a resistance against modern copyright system:

> *The open-source software. . . It's just if you make whatever you're doing open source, then everybody will have the opportunity to comment on it, to make it better. . . If you make it open source, as long as people know about your project, you will have a very large community who wants to improve your project.* (Interview 4)

> *Well, open source pretty much means that you release it to the world and then anyone can create or modify it. . . If you have it open source, then more people could come in and help you make contributions to your software partner. . . Well, it pretty much means that you have more ideas for your project. . .* (Interview 9)

The open-source ethos has its geographical home on the west coast of the US, in what came to be known as the Californian ideology. Its influence now has global reach, including the maker community in this research. Rosa et al. (2018: 14) emphasise that some driving values of the maker movement, including the open culture and sharing, can inspire policies relating to work, jobs and employment. Indeed, such open and sharing ethos are prevalent in makers' working life. As interviewee Abed says, members of Litchee Lab '*share some life things*', such as finding partners, sharing hometown foods, going hiking and having dinners. The open-source ethos thus has its root in makers' lives. Interviewee Violet also mentions how members in X.Factory help each other and she gives an example of the 'free sharing' ethos. X.Factory wanted to recruit a volunteer lecturer from its members for an art journal workshop. The job came with a bonus as remuneration. A member took the job but rejected the bonus, as he preferred to 'share his knowledge for free'.

Therefore, free sharing, the core of the open-source ethos, acts throughout makers' working lives. However, this is not to say that the open-source ethos is naturally born, but rather that it is sometimes cultivated and managed by the maker spaces. Lei, a branding manager of Simply Work, states that the way they put the fridge, microwave and cafeteria table in the maker space is to encourage members to have conversations. Not to mention regular events hosted in all maker spaces that provide a perfect chance for makers to gather.

> *I think that is a community here where helping people, we try to push that as much as possible without it being a burden on anyone. . . They (the alumni) get gratitude and pizza basically, so we try to make sure that everything is concise, that you don't take too much time of the alumni and you possibly get the answer. That creates this culture of helping, sharing. . . So that is the kind of community we have at HAX. . .* (Interview 6)

> *Every month we have different themes of events, hosting in every district. . . These events are kind of like giving opportunities for people to have a chance to talk to each other, to share with each other, because when they come here, they join the events, they see how those giants, successful people became giving a talk on the stage, they are actually getting new knowledge and new experience from those people what they have done before. . .* (Interview 14)

During my participant observation in X. Factory, I was involved in several events organised by the space. For example, I attended a show of collaborative projects between a high school in Switzerland and X. Factory. Students from Switzerland were invited to present their ideas and prototypes to makers based in Shenzhen, who provided useful comments and suggestions to improve the prototypes.

These events not only provide makers opportunities to share ideas and information, but also create a culture of mutual help. Undoubtedly, it is the centre of open-source ethos, sustaining the micro-innovation practices. An interviewee from SZDIY (a free software/hardware enthusiasts community based in Shenzhen), Dale, introduces that SZDIY aims to incubate a non-profit and self-supported culture. Therefore, most stuff in the space is contributed by members, such as tissues, water, desks and self-assembling computers.

Shenzhen DIY also organises regular events every Thursday to enable its members to share technology topics, such as the most popular skills and individual experiences of applying certain hardware or software. According to Wu, one of the members, the Thursday gathering and its internal networks show a certain type of practice:

> *You want to do a thing, and then you pull friends here to DIY, anyway, there are lots of semi-finished products here*. (Interview 16)

I was surprised to find even a semi-finished DIY car in the space.

Wen (2017: 357) arguably anticipates that open-source ethos will eventually lead to the next industrial revolution, as far as owners of patents and copyrights allow open access to technology. This certainly echoes the *New Shanzhai* argument – a revolutionary innovation-led economic development centring on an open sharing culture. However, I do not overemphasise the economic productivity of such a micro-innovation model initiating from the open-source ethos, as I can only observe practices and community events centring on the open-source ethos. It is still too early to expect a revolutionary economic transformation from the bottom, such as the 'fourth industrial revolution' debates and the MIC2025 policy. Instead, as Rosa et al. (2018) identify, 'ethics and values, such as care, sharing, openness, new forms of solidarity' (p. 57) as key drivers of work futures, I argue that the open-source ethos here are more likely to stimulate sociocultural dynamics, such as the concern of benefiting vulnerable communities and building up a friendly ecosystem based on recycling practices.

The labour agency initiating from a sociocultural concern towards common good

Thompson (2016: 117) argues that new forms of collectivism are probably nourished by 'moral projects linked to social justice values'. It certainly links to the digital labour research on labour agency. For example, the 'internal rewards' attached to cultural work, such as 'good work for its own sake, and contributing to the standards of excellence and ethical framework of the practice in question' (Banks 2010: 265), prompt the internet idealism. Kennedy (2012) introduces Berners-Lee's work in her book, whose original dream of the web when he invented it was that it would be an open, interoperable and accessible medium, whose power would be in its 'universality', and to which access by everyone was 'an important aspect'. Kennedy argues that this vision often orientates internet workers towards certain ideals and idealistic individuals towards internet work. Banks (2007) reminds that cultural workers not only work to generate profits, but also to create 'concrete political interventions and social benefits' (p. 164). Xia (2014) explores internet workers' practices that intend to create an open and accessible online space for everyone, especially for the most vulnerable communities.

Likewise, Rosa et al. (2018) explore ethics and values, including openness, sharing and matters of care as key drivers of maker movement. They further characterise makers' caring as a pursuit of 'personal quests of creativity and fun' (p. 13) as well as a response to 'theirs or collective practical needs' (Rosa et al., 2018).

This moral idealism concerning vulnerable communities or ethics and values in maker movement indeed is shared by the maker community in the research. An interviewee

from SZDIY, Lance, showed me a telephone he made for his grandmother, who does not know how to use a telephone because she is illiterate. Lance put his relatives' pictures on top of the phone and stored their numbers in a memory system, which had been set up beforehand on the phone, so that his grandmother could make a call by simply pressing any key with an inch-sized photo.

Lance was not the only one who helped vulnerable communities using his/her products. Jacob, a maker in X. Factory, was engaged in a robot project called Machine Guide Dog at the time when I interviewed him. Jacob designed the robotic guide dog for blind people, as he found training a guide dog in China costed an average of US$20,000–US$$30,000 and it took almost a year. This is a heavy burden for most blind people in China. Then he created the robotic dog in order to address 'concerns towards the society' and to 'solve some real problems in daily life' (Interview 7).

Alex, a maker in HAX, shared his idea about the robotic project, Trainerbot. This is a robot equipped with several physical training programmes that enable users to access their training experiences as well as to create their own drills and games. In Alex's understanding, Trainerbot '*brings the whole world together, without any borders or language barriers*' (Interview 2). According to Alex creating this robot certainly shows makers' motivation to help vulnerable people: '*I believe we can help a lot of people in the world, and it's a beautiful thing to us makers to just make something beyond for your own pleasure and your own coolness and can benefit potentially millions of people out there*' (Rosa et al., 2018).

Eddie and Anthony, the two teen makers in X. Factory, created an agnostic platform called *kidstokids.com*. This online forum organises workshops teaching kids coding skills and offering seniors a space to share their school experiences with juniors. Their understanding of the communities they would like to contribute to is valuable here:

> . . .*I just want to clarify, we want to benefit the global community, but we have to remember that change starts on a small scale. That we have to eventually ramp it up to a large scale. So, right now we are like on Ridgewood. . . We're benefitting that and we're also benefitting the surrounding areas. . .* (Interview 4)

The concerns towards the vulnerable communities and the surrounding communities match perfectly with the case of how makers' products and projects can benefit the urban villages in Shenzhen. For example, Lichee Lab organised some elementary school students to visit a nearby urban village and to find out the living difficulties of its residents. These kids were encouraged to solve these living problems using tools and skills learnt in Litchee Lab. Eventually, they built up the ideal community model with paper model.

Vicky, the global cooperation director of SZOIL, also introduced a similar urban village programme: their programme starts with mapping and analysing the situation of the area they chose to set up a maker space. They equip the maker space with all the machines made by local resources. Then they encourage local people to join in the maker community to create things, such as products or public art, to benefit the local community.

Xia's (2014) work on Chinese internet workers' concerns towards common good argues that setting up one's own business aiming to create a new space for free thinking and choices indeed is a morally focused practice that contributes to the common good. Here, maker community's morally focused practices, such as creating social benefit

products and helping surrounding communities achieve self-sufficiency, certainly indicate makers' agency initiating from a sociocultural concern towards the common good. It is admitted that some makers aim to commercialise these products, such as the robotic guide dog and Trainerbot. It is still appreciated that workers realise the social value of their products in the process of commercialising them. At least, this shows the opposite of what the political philosopher Russell Muirhead criticised – '(the) contemporary versions of the work ethic are ethically fragile' (Hesmondhalgh and Baker, 2010: 37) as they rest on 'a combination of blind habit, a steely will to survive amid heartless competition, and the promise of status and physical comfort' (Muirhead, 2004: 11). Moreover, projects on the urban village certainly develop the work ethic from the private profit motivation to the public and the common good contribution. Human conceptions of the good involved in creative work, such as makers' practices here, are systematically extended.

Rosa et al. (2018) identify the green economy, 'the economic process restructuring towards a circular model in which resources are reused repeatedly' (p. 39), as one of the thematic narratives emerging from current maker movement. As one of the aims of maker movement, bringing waste materials back into the mainstream with an added value then addresses societal challenges and takes over issues that are relinquished to the governmental institutions. Here, eco-friendly and sustainable projects are the other sort of practices initiating from the sociocultural concerns. Kim, CEO of the Workshop, introduced his client's project of notebooks made from recycling material. Jay, the operation manager of SEG Maker, introduced the members' project that builds wind generating power stuff in the lab with environmental concerns. Vicky introduced some government grants that encouraged green-tech projects. Violet explained that some decorations in X. Factory, including a round table and a dining table, were recycled from a construction site near the space. Zona, a maker in HAX expressed these makers' sociocultural concerns in the eco-friendly practices:

> *I think as we make those products look cooler, and the next generation we want to encourage. . . but we also want to encourage that kind of lifestyle, self-sufficient and recycling type of thinking.* (Interview 17)

Though all these practices might be individual, they still show a new tendency in the maker community that centres on recycling, self-sufficiency and eco-friendliness. A more collective case of eco-friendly project is Huaqiangbei's transformation in recent years. Huaqiangbei, traditionally taken as China's *shanzhai* mobile phone heartland (Keane and Zhao, 2013; Liu et al., 2015), now is a space providing makers with immediate access to tools and components (Lindtner et al., 2015). However, such research may not realise there is a new transformation emerging in the area. My interviewees, Hao and Wu, brought me to Huaqiangbei several times during our fieldwork in Shenzhen, and I realise that it has been transformed into a space for a recycling value chain: broken electronics in Europe and US were first shipped to Hong Kong and then transferred to Shenzhen. If items such as iPhones are repairable, people in Huaqiangbei will repair them and sell them as second-hand items to the Third World countries. If they are unrepairable, the broken electronics will be shipped to Shantou, a small coastal city near Shenzhen. Small family workshops there will take out electronic components such as

circuit boards and refurbish them. The refurbished components then will circulate in the market again. Both interviewees think Huaqiangbei is now joining in the recycling economy by '*turning lots of garbage into treasure*' (Interview 5), owing to the strong industrial chains in Guangdong.

I do not overemphasise the recycling role Huaqiangbei is playing in the global value chain, as further sophisticated research on tracing this value chain is needed. Rather, I point out Huaqiangbei's recycling role in Shenzhen's maker movement, which was not realised in other research on Shenzhen's maker movement (Lindtner, 2014; Lindtner et al., 2015; Mengoni, 2015): it shows a collective practice of recycling and repurposing electronic products. Surely, the motivation is commercial; however, it is still appreciated for its potential of raising an eco-friendly concern. Rather than accepting the idea that the green economy is to be appropriated as a rhetorical device of the mainstream economy, Rosa et al. (2018: 11) highlight it as a key narrative in the maker movement. I then suggest an important tendency in Shenzhen's maker movement: makers' practices aiming to develop a sustainable and eco-friendly culture. In other words, maker movement research may share certain issues with the research on internet idealism: the labour agency initiating from sociocultural concerns.

If I return to the exploitation critique of the digital labour originating from Marx's work on alienation, it is no doubt that some workers do not or are unable to care how their products affect the industry and the society. In contrast, makers' concerns towards how their products and projects can benefit the environment and the industry, as well as their intention to benefit the common good, are valuable to suggest their contribution to renewing the critique of digital labour. As Ackroyd and Thompson (2016) emphasise in their research on the misbehaviour in the workplace, the new way of exploring misbehaviour must reconstruct our knowledge by making clear the new forms of resistance. Here, I value makers' agents involved in the moral concerns towards the common good. I further suggest the practices may create a possible future that is beyond the current economic concerns in the research on maker movement and maker culture.

Conclusion

The second wave labour process theory develops a control, resistance and consent model, with a variety of outcomes including compliance, consent and conflict (Ackroyd and Thompson, 2016; Thompson and Newsome, 2016). However, Ackroyd and Thompson (2016) point out that new spaces and possibilities for the misbehaving acts increase in diversity and scale. Banks talks about a 'remoralized future beyond capitalism' created by the 'existing and emergent forms of cultural production' (Banks, 2007: 171). He argues that even the negative forms of labour agency may result in 'a radical decoupling of autonomy from the instrumental imperatives it was originally provided to serve' (Banks, 2010: 261). Banks (2007), therefore, anticipates that emergent forms of cultural production, which do not originate from or aim to produce economic capital, would probably create new forms of capital accumulation that lead to an alternative of capitalism.

It is not my intention to overemphasise the revolutionary productivity of labour agency, but rather, I suggest that makers as a sort of digital labour may renew the existing critique of digital labour, as some makers' practices certainly show their motivation

initiating from a sociocultural concern beyond the exploitation critique of digital labour (e.g. the dualism of exploitation and workplace resistance). This sociocultural concern involves an awareness of free sharing and mutual support, as well as the open-source ethos leading to a 'micro-innovation' model. Some maker spaces cultivate the makers' awareness by having certain arrangements in the spaces and organising social events. In turn, makers create projects and products aiming to benefit vulnerable communities and build up a sustainable ecosystem by eco-friendly practices such as recycling. This may turn the current discussion on the economic predicament of the marker movement to a new research tendency on the sociocultural impact of the maker movement.

Many researchers believe maker movement encourages individuals to engage with and adapt to the world where they are living with the creation of tinkering environments (Enderle and Murphy, 2015; Wilkinson and Petrich, 2014). Makers are therefore encouraged to practice ethically with heterogenous ethical purposes, such as sharing, openness, caring, creativity, collaboration and solidarity (Rosa et al., 2018). Arguably, the sociocultural concern towards benefiting vulnerable communities with certain commercial products may return to the existing critique on the internet idealism – the emerging conventional capitalists in waiting due to the financial motivation. However, there is the other side of the coin. Hesmondhalgh and Baker (2010) suggest a framework for assessing good creative work should involve the social and cultural value of a product. They claim that the good work needs to produce 'goods and services that are *excellent* and that *promote aspects of the common good*' (p. 35). The notion of '*promote(ing) aspects of the common good*' is understood as practices contributing to others' well-being, having a significant impact on the industry and the society, and benefiting the environment. Regarding making as a form of future work and, in Hesmondhalgh and Baker's words, 'a good future work', Rosa et al. (2018: 25–26, 70) believe that a reflective solidarity, centring on the fundamental bonding through diverse and critical dialogues, can be realised within and through makers' divergent and different practices and needs. Reflective solidarity certainly offers makers opportunities to negotiate other forms of solidarity. Likewise, the makers' practices identified in this research, on the one hand, contribute to others' well-being, such as that of vulnerable communities and surrounding communities more generally. Additionally, makers benefit the environment with eco-friendly practices. It is therefore necessary to acknowledge the sociocultural impact of the maker movement and maker culture. I therefore suggest a switch in the research on the maker movement and maker culture from an economic approach to embrace social impact concerns, with the possibility to fill the gap between maker studies and digital labour studies.

Declaration of conflicting interests

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Notes

1. Given that these events ran concurrently both in the UK and Shenzhen, we were served well by the fact that one of us was local to Shenzhen – and as such, could attend the events in the city while another team member was based in the UK, meaning we were able to participate in some of the events, notably in Edinburgh and London.
2. Our stay(s) at each of the other sites ranged between half of a day and 3 days.

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