

REVIEW ARTICLE

Revisiting the Geography of Globalisation in the Covid-19  
Pandemic using Risk Theory

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**Abstract**

My review paper is part of Covid-IAS Project, funded by National Research Council of Thailand. The paper focuses on the geography of globalisation in the Covid -19 pandemic. I employ Ulrich Beck's concept of risk society to critically examine geography. Although Beck is not a geography theorist, his theory can be used extensively and alternatively to study the geography of globalisation. By drawing upon Beck, I argue that the geography of globalisation in the context of Covid -19 displays forms of dependency upon the politics of knowledge about Covid -19 vaccines. With the production of knowledge, the vaccines have caused various forms of dependency, including global dependency (external knowledge about the effectiveness of the vaccines and their side-effects), regional dependency and international dependency (the EU and its member states), the interplay between global dependency and international dependency (COVAX), and the emergence of the nation states as regional production hubs (AstraZeneca vaccine). Although Beck's theory enables us to critically investigate the geography of globalisation, Beck ignores the significance of the nation states in globalised risk situation. In contrast with Beck, I suggest that nation states have still played important roles in world risk society, especially in the context of Covid -19

**Keywords:** *Geography, Globalisation, Ulrich Beck, Risk Society, knowledge Production*

## Introduction

Covid-19 is regarded as a global phenomenon that affects each country differently. Although the virus was first identified in Wuhan, China in December 2019 (WHO, 2020a), its rapid transmission rendered borders and national barriers irrelevant. It has threatened healthcare systems and medical services, undermined national/international economies, political stability, and societal systems. In other words, Covid-19 has become a universal threat and danger to humanity. But not everyone is able to manage the risks from the pandemic. It has become too broad, too rapid, and too challenging for any global actor or nation state to act alone. This is because risks involve globalisation. “Modernisation risks possess an inherent tendency towards globalisation, in which a universalisation of hazards associates with industrial production, independent of the place where they are produced” (Beck 1992, 21 and 36). Risk derived from modernisation process is not restricted to its place of origin, but can spread, regardless of distance. As Beck states, “we are more concerned with problems resulting from techno-economic development itself, and modernisation is becoming reflexive”(Beck 1992, 19). Developments in modern societies have reflected back upon themselves which development simultaneously has brought with it danger and hazards. The Covid-19 pandemic associates with the developments of technology, transportation systems and flows of tourists which characterise our modern society. Although the notion of risk is central to globalisation, little attention is given to the effects of risk on reshaping the geography of globalisation.

This review article aims to revisit and explore the geography of globalisation, and ground it in the context of Covid-19<sup>1</sup>. Beck’s risk society is used extensively to capture a changing geography of globalisation. Beck is not a geography theorist; however, his theory may help shed critical light on geography in world risk society. I only look at some relevant elements of Beck’s ideas. As previously noted, Beck’s theory of risk is enmeshed in globalisation, since risk causes national borders to be irrelevant. By drawing upon Beck, I argue that the geography of globalisation in the context of

<sup>1</sup> The Covid-19 IAS project was conducted in 2020-2021. This review article was written in 2021 amidst the widespread of Covid-19 pandemic and the implementation of the national lockdown. I only used references, along with sources that were available during that time.

Covid-19 manifests forms of dependency on the production of knowledge about Covid-19 vaccines. To emphasise, modernisation risk, in this case, refers to the spread of a new, deadly virus. To go further than Beck, I would suggest that the production of knowledge about Covid-19 vaccines may support forms of dependency among different countries, rather than eroding the roles of the nation states. To substantiate the main argument, information derived from news articles is useful in analysing dependency on knowledge about Covid-19 vaccines. Prior to the discussion of risks from the pandemic, I will look briefly at some debates on the geography of globalization.

### Revisiting the geography of globalization

Existing literature on the geography of globalisation enables us to study social interactions between the global and the local, and between the regional and the local. However, it might be insufficient to conceptualise geography of globalisation in the context of the pandemic. Two limitations will be outlined as follows. First, much existing literature is one-sided, focusing on an overarching economic structure. Wallerstein's World-Systems Theory, claims that the modern world is a single capitalist economy (Wallerstein 1975, 6). This comprises a single division of labour which involves a significant exchange of goods, and flows of capital labour. Wallerstein's World System consists of core, semi-periphery and periphery countries (Wallerstein 2004, 23). These three positions are unevenly interrelated where the economic development of peripheral countries has become dependent upon the economic performance of the core and semi-peripheral countries. Within this system, peripheral countries are the most disadvantaged. This form of geography results in unequal economic exchange between the three. In contemporary globalisation, this system may somehow persist in different economic sectors in which core countries may refer to so-called developed countries, whereas peripheral countries may refer to developing countries and the third-world countries. Although Wallerstein's theory is useful to capture geography of globalisation, his work only focuses on inter-state relations in a global economy where goods and materials from peripheral countries flow into core countries, or where direct investment from core

countries flows into peripheral countries. His work overlooks the complexity of globalisation in which geography of globalisation is reduced to single division of labour.

Going beyond Wallerstein, Harvey focuses on the expansion and accumulation of capitalist economy across time and space. “The contemporary form of globalisation is another round in the capitalist production and reconstruction of space, and it entails a geographical restructuring of capitalist activity across space, and the production of new forms of uneven geographical development” (Harvey 2001, 24). Capital is temporary rather than permanent. Capital invested in a place can construct industrialised space which requires labour power, land, transportation, market and machinery in order to fulfil the production process. This refers to flows of global capital into a local place, and causes changes at a local level. When the production process reaches its full capacity, capital will move into another place, and reconstruct a new space of industrialisation to gain more profits. This may leave its previous space and resources devalued. The expansion and accumulation of capitalist production can cause the production or reproduction of space, or undo it. For Harvey, globalisation seems to be no more than the capitalist economy and the latter thus happens to be a structural form of globalisation of which its down sides and other dimensions have not yet been unveiled.

Other scholars who recently attest to geography of globalisation using an economic approach are first, McCann, who analyses how changes in global economic geography are related to various technological and institutional changes that are currently taking place in the economy, and this makes the world curved rather than flat (McCann 2008, 351). Second, in studying globalisation in the time of Covid-19, Sforza and Steininger state that “incorporate production barriers induced by Covid-19 shock with sectoral linkages, trade in intermediate goods and sectoral heterogeneity in production, and they find that the Covid-19 shock triggers a considerable impact on most economies in the world, especially when a share of the labour force is quarantined” (Sforza and Steininger 2020, 0). These scholars focus attention on the interrelatedness of economic dimensions and other social dimensions, the former centering upon global economic changes with

technological and institutional changes, while the latter stressing the effects of the pandemic on the global economic expansion. The works of McCann, and Sforza and Steininger enable us to see the effects of economic dimension on forming geography of globalisation; however, geography of globalisation merely emerges as the effects of the overarching structures.

Another form of the overarching structure is the development of technological communication that has resulted in “the interface between space of flows and space of places” (Castells 1999). Castells contends that “most dominant activities, financial flows, management of major corporations, networks of firms, and forms of ideas and information, are constructed around the space of flows, while most experience and social interaction is still organised around place” (Castells 1999, 296). The space of flows is interconnected with the space of places, and each conditions the other. This helps us to understand the changing geography of globalisation. But still, Castell’s space of flows predominantly supports the expansion of capitalist economy, while overlooking the significances of other social dimensions in reconfiguring geography of globalization.

Apart from this, the other limitation of existing literature on the geography of globalisation is that it regards nation states as one of the components of transnational networks. Sassen regards globalisation as “transboundary.” She views globalisation as,

*two distinctive sets of dynamics which the first entails the formation of explicitly global institutions and processes; namely WTO, global financial markets and more besides, and the second occurs inside territories (localised at national level) that engages transboundary networks and formations linking with multiple locals, and involves the recurrence of particular issues in the number of countries* (Sassen 2003, 1–2).

Transboundary, in this case, refers to social relationships beyond states, between global institutions and states, or between a local place and others. Therefore, the role of the nation state becomes submerged beneath transnational networks. Brenner, interestingly, argues that “the contemporary round of globalisation has radically reconfigured the scalar organisation of territorialisation processes under capitalism, relativising the significance of the national scale while simultaneously intensifying the role of both sub- and

supra-national forms of territorial organisation" (Brenner 1999, 52). Rather than undermining the significance of the nation state, globalisation accompanying capitalism reconstructs the positions of the state which they then enmesh in sub- and supra- forms. The sub-form may exemplify the interaction between one industrial city and another, and between social movement in one place and others; whereas supra-form refers to supra-national cooperation, such as the European Union, transnational economic and political organisations. States have still existed in various forms of the territorial organisations.

To be more specific regarding the positions of the states in a regional network, Enderwick and Buckley highlight the effect of Covid-19 on geography of globalisation. "The pandemic will push the world economy towards a more regionally-focused composition, and reinforce the notion of the nation state at which medical, security and economic responses to the pandemic have originated" (Enderwick and Buckley 2020, 103-4). Within the current context of Covid-19, the extent of the global perception has shifted towards regional cooperation, which does not only restrict to economy, but also other social dimensions, especially medical responses. We can take the EU and its vaccine rollout as an example. "In June 2020, all 27 member states joined a scheme giving the EU central responsibility for buying vaccines, and the EU made agreements to purchase Covid-19 vaccines from AstraZeneca, Pfizer-BioNTech and Moderna" (BBC 2021c). In this case, geography of globalisation shows regional dependency in which the roles of the nation states tend to get subsumed under the regional network. However, this article suggests that there emerge other forms of dependency in the context of the pandemic which nation states play important roles. Beck's risk society will enable us to study these. His theory will be discussed as follows.

### Globalisation and risk society

To alternatively study geography of globalisation in the context of Covid-19, I suggest we may direct our attention to risk society which will enable us to conceptualise structural changes in contemporary society. Starting with Giddens's classic work, Giddens proposes that:

*with global industrial development, along with modern capitalism, our very attempts to control the future are likely to rebound upon us that is forcing us to look for different ways of relating to uncertainty* (Giddens 2002, 21 and 26).

Giddens' notion of risk implicitly relates to globalisation, as risks nowadays derive from the effects of global industrial development and the capitalist economy. In other words, risks are the reflexive accounts of our developments. Our developments reflect back on us. In embracing profit from capitalism, and progress from industrialisation, therefore we are inescapably subject to risk. In this sense, the characteristics of risk parallel those of globalisation; particularly extensivity<sup>2</sup> and velocity. Risks can spread across time and space; no matter how far we live from the place that originated that risk. Also, for Giddens, globalisation is implicitly equivalent to Westernisation processes, including industrialisation and modern capitalism, both of which disregard forms of development in non-Western society (see also Robertson 1994). Providing that each society has different forms of development and modernisation, would it be subject to the same form and level of risks? Giddens does not state this point explicitly.

Apart from Giddens, Beck is another prominent sociologist whose work centres upon risk society. "Risks induce systematic and often irreversible harm, generally remain invisible, are based on causal interpretations, and initially only exist in terms of the scientific or anti-scientific knowledge about them which they can be changed, magnified, dramatised or minimised within knowledge and they are, to that extent, particularly open to social definition and construction" (Beck 1992, 23). Risks emerge in causal interpretations, as well as knowledge about them. These are neither static nor singular; instead, they can be socially deconstructed and reconstructed. Causal interpretations of risk are very much dependent upon social definition. Beck sees the distribution of risk as boomerang effect: "Sooner or later the risks would catch up with those who produce or profit from them, and their diffusion affects both the rich and powerful, while latent side effects can strike back even at the centres of their production" (Beck 1992, 37).

Risks catch up with all countries, even the rich and powerful. Despite being global, they affect countries unevenly. Beck views 'risks adhere to the class pattern, only inversely: wealth accumulates at the top, risks at the bottom' (Beck 1992, 35). Or, the poor are the worst affected by risks. The poor mostly do not have an access to economic and social resources to

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<sup>2</sup> On the characteristics of globalisation, see D. Held, A. McGrew, D. Goldblatt, and J. Perraton (2000), "Global Transformations: Politics, Economics and Culture," in *Politics at the Edge* (London: Palgrave Macmillan), 14–28.

alleviate risks. To deal with risks, people have become dependent upon knowledge such as scientific knowledge and medical knowledge. The degree, the extent and the symptoms of people's endangerment are basically dependent upon knowledge; thus, risk positions have created dependencies that are unknown in class situations (Beck 1992, 53). Without the scientific knowledge, we may not be able to identify people's endangerment. Solutions to risk situations also depend on knowledge. A dilemma emerges at this stage which solutions to risk situations may trigger side effects, or another cycle of risks. "Statements, along with experiences with side effects are worth nothing; unless it is scientifically proven as such" (Beck 1992, 61). This may lead to forms of dependencies on knowledge, which, in this case, Covid-19 vaccines uses can be examples. By expanding the scope of risk globally, my analysis of the current form of geography of globalisation will be drawn from Beck's *Risk Society*. By doing this, I argue that geography of globalisation in the pandemic principally centres upon forms of dependency on the production of knowledge.

Apart from the distribution of risk, Beck's risk society pertains to globalisation which he suggests that transnational cooperation is needed to deal with risks. Beck even advocates a term called 'cosmopolitanisation'. 'Cosmopolitanisation means internal globalisation, globalisation from within the national societies. This transforms everyday consciousness and identities significantly.' (Beck 2002, 17). A cosmopolitan perspective does not only see individuals and states are becoming interconnected, but also the internalisation of globalisation in the nation states. In other words, nation states enter their own declines. But later, in his interview with Wimmer and Quandt (2006), Beck admits that 'the globalised risk situations do not automatically lead to a cosmopolitan interest in new instruments, institutions and answers on a global level, and we experience that the nation states permanently fail to solve these problems on their own' (341-342). He sees nation states as incompetent to solve global risk situations. However, nation states have still play important roles in dealing with global risk situations. Relating to the case study of Covid-19, nation states do not disappear. Instead, with knowledge production of Covid-19 vaccines, some nation states remain superior to others, while others have become dependent upon them. Forms of dependency on knowledge reshape geography of globalisation in the Covid-19 pandemic. The manufacturing of Covid-19 vaccines tends to

promote forms of dependency among different nation states rather than cosmopolitanisation and transnationalisation, with nation states appearing as parts of the processes. Unlike Beck, I contend that nation states more or less, in this case, play important roles in reconfiguring geography. What follows is a discussion of the changing geography of globalisation in the context of Covid-19, along consideration of Beck's theory.

### **The Politics of Knowledge about Covid-19 Vaccines and the Emergence of Forms of Dependency**

With risk theory, the geography of globalisation in the context of Covid-19 pandemic manifests forms of dependency. The vaccines are essential tools in relieving the intensity of Covid-19; yet only some countries are able to produce the vaccines. Or, only some nation states can perform as producers of knowledge. Main vaccine manufacturers include, from the West, Pfizer-BioNTech, Moderna, AstraZeneca, and from the East, Sinopharm and Sinovac.<sup>3</sup> The first two are produced by American pharmaceutical companies, while the third is developed by a UK pharmaceutical company. Unlike the former group, Sinopharm has been developed by Beijing Bio-Institute of Biological Products Co Ltd, subsidiary of China National Biotec Group (WHO 2021c). Vaccine manufacturers are thus nationally based. Vaccines manufacturers are concentrated in first world countries (the US and the UK), while China, together with Russia (the Sputnik vaccine) appears to be contestants with those in the first world. Other rich, middle-income and lower-income countries are dependent upon knowledge production of Covid-19 vaccines to minimise risks from the pandemic- these countries have to purchase Covid-19 vaccines from the manufacturers, and profits return to the country of manufacture. This reflects a geography of globalisation in the form of international dependency in a general sense which nation states play important roles.

However, the effectiveness of Covid-19 vaccines must be approved by World Health Organisation and the team of experts in order to be used across countries. Geography of globalisation appears to be global dependency on the production of the scientific knowledge certified by WHO.

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<sup>3</sup> This article only looks at Covid-19 vaccines that are widely used in many countries

*WHO relies on the Strategic Advisory Group of Experts on Immunisation (SAGE) in order to issue policy recommendations on Covid-19 vaccination to Member States, and with evidence-based medicine, and the support of a dedicated Covid-19 working group, WHO and SAGE have initially allowed the following vaccines for the interim usage, Pfizer-BioNTech, AstraZeneca, and Moderna (WHO 2021f; 2021g; 2021e).*

The lists of Covid-19 vaccines are later added with Johnson and Johnson (Janssen vaccine) and Sinopharm (WHO 2021d). Although vaccines can protect from the most severe effects of Covid-19, they have varying levels of efficiency. According to the WHO report on Covid-19 vaccines, the Pfizer vaccine, with a two-dose regimen given 21 days apart, has conferred 95% protection, while the Moderna vaccine has been shown to have an efficacy of 94.1%, based on a median follow-up of two months (WHO 2021e). The AstraZeneca vaccine (recombinant) against Covid-19 has had an efficacy of 63%, two doses of Sinopharm vaccine have showed an efficacy of 79% against the virus infection, and two doses of Sinovac-Coronovac have shown an efficacy of 51% against infection (WHO 2021c). In this case, degrees of protection, as well as efficacy, rely on the scientific knowledge and data received and approved by WHO. Covid-19 vaccines have been manufactured and widely used across countries to deal with and manage risks from the Covid-19 pandemic.

Although the vaccines help to boost immunity, people have raised doubts about the vaccines, especially possible side effects. Covid-19 vaccines are regarded as a way to manage and minimise risks on the one hand, while they themselves accompany both perceptible and imperceptible side effects on the other. As well as efficacy, vaccines are also associated with side effects. As the WHO suggests, “it is common to experience some mild to moderate side effects when receiving vaccinations, this is because your immune system is instructing bodies to react in certain ways ... these side effects include fever, pain at the injection site, fatigue, muscle pain and headache” (WHO 2021b). Similarly, reported side-effects of the vaccines require the scientific knowledge, results from clinical trials and confirmation by statement from the WHO.

The WHO, as a global organisation, has produced knowledge about Covid-19 vaccines efficacy, and their side effects. Although the sciences play important roles in constructing knowledge and identifying side effects, decisions on risks may or may not agree with scientific arguments, depending on interests and utility. This is the stage where nation states play important roles in determining the uses of the vaccines. Despite the approval of the WHO (and scientific evidence), perceptions of efficacy of Covid-19 vaccines seem to be independent of the former. Nation States are subject to different degrees of risks, depending on their interpretations of knowledge about Covid-19 vaccines. Form of geography of globalisation is somehow international dependency. Thailand, for example, currently has use of the Chinese vaccine, Sinovac AstraZeneca and Sinopharm. Connolly also reports that “although Sputnik V [Russian vaccine] has not yet been approved by the EU’s European Medicine Agency, it has already been ordered by many different countries from Argentina and Mexico to Israel and the Philippines which Russian officials say they have signed deals to produce it in South Korea and India” (Connolly 2021). The EU has already signed contracts for manufacturers including Pfizer-BioNTech and AstraZeneca; still its members states can make their own decisions on using Covid-19 vaccines, for example, Hungary has already bought and distributed considerable quantities of Sputnik V, while the import of 200,000 doses of the Russian Vaccine has brought down the prime minister of Slovakia, as he had not consulted his coalition partners (Connolly 2021).

Form of geography of globalisation shows the interplay between global dependency and international dependency, COVAX can be an example. Despite being a global scheme, much relies on international cooperation, and donors are all first-world and developed countries with knowledge of vaccine efficacy – this marks them out as superior to other countries in knowledge production. Lower- and middle-income countries are able to participate in the COVAX project initiated by WHO and UNICEF in order to create global, equitable access to Covid-19 vaccines (WHO 2021a). The BBC states that COVAX is the programme that ensures Covid vaccines made available around the world, with richer countries subsidising costs for poorer nations, and donators are the US (500m doses of Pfizer vaccine), the UK

(100m doses), Germany, France, Italy and Sweden while Japan and the EU have pledged to donate £709m and £432m respectively (BBC 2021b). COVAX may be thus a so-called global scheme with some national actors being superior to other countries in knowledge production on the international stage

Moreover, one vaccine manufacturer has reconfigured geography of globalisation further than forms of dependency; that is, Oxford-AstraZeneca. The company has made some countries emerge as a regional production hub. This vaccine has greatest global reach which about 130 countries and territories have used the vaccine" (BBC 2021a). This may be because the company has used different national suppliers. This shows the cooperation between the vaccine company and nation states. AstraZeneca reports that "it has established manufacturing capacity in fifteen countries and twenty-five different manufacturing sites to supply vaccine to every region of the world as quickly as possible" (AstraZeneca 2021). According to the BBC(2021a), The Serum Institute factory in India is a major supplier of the Oxford-AstraZeneca vaccine to COVAX scheme, yet officials in India have halted exports to protect their own population amid soaring infection rates which results in a shortfall in the scheme. AstraZeneca not only encourages dependency on its Covid-19 vaccine on a global scale, but also turns those manufacturing places in different countries into vaccine suppliers. The company works closely with suppliers to deliver vaccines to different countries. The vaccine manufacturing process is not thus concentrated in a single country, but is rather spread between different ones. Its flows of vaccine technology have therefore assisted those countries as suppliers become sub-centres of the vaccine production. Or, nation states are reterritorialised as production hubs. I will take Thailand as an example here.

*Covid-19 vaccines that are produced in Thailand by Siam Bioscience, a Thai company making vaccines for the first time, are distributed to other Southeast Asian countries, including Malaysia, Philippines, and even Taiwan, but the destination countries warn that there would be delays in deliveries of AstraZeneca vaccines (Bangkok Post 2021).*

*Thailand, expecting to receive six million doses for June, last week received 1.8 million locally-produced doses, and 200,000 imported from South Korea (Bangkok Post 2021)*

Thailand has become one of the production sites for AstraZeneca vaccines, and this will assist other neighbouring countries in facilitating access to the vaccine. AstraZeneca (2021) regards Thailand as a regional production hub which the country can play an important role to support other Southeast Asian countries to fight against Covid-19. In this case, Thailand has received the transmission of medical technology and knowledge about the vaccine from the AstraZeneca company, based in the UK. The production of this Covid-19 vaccine has reconfigured geography of globalisation which not only highlights dependency on external knowledge from the company located in the first world country, the UK, but also transforms the role of the nation state (Thailand) in becoming the regional hub in the manufacture and distribution of the vaccine to alleviate risk from Covid-19. Delays in the production process have affected vaccine delivery to other neighbouring countries, and the distribution of the vaccine in Thailand itself which has resulted in the country needing to import AstraZeneca doses from South Korea. This illustrates dependency on vaccine supply between one production site and another.

At this stage, we can see that Beck's notion of risk society, to some extent, can shed critical light on the geography of globalisation in the context of the Covid-19 pandemic. Geography of globalisation is likely to be reconfigured as multifaceted forms of dependency on knowledge of Covid-19 vaccines. This has produced international dependency, global dependency, the interplay between global dependency and international dependency and a regional production hub. With forms of dependency, nation states, to some extent, play important roles in making decisions of the uses of Covid-19 vaccines, and becoming sub-centres of the vaccine production.

#### **Discussion of Beck's Risk Society**

Beck's theory of risk enables us to interestingly capture geography of globalisation. However, there are some limitations of working with his theory in the context of Covid-19 pandemic. First, Beck pays great attention to risks from ecology, environmental problems, pollution, chemical toxins, while risks from disease and epidemics receive scant attention. Future study on risks from the pandemic and other diseases may add something new to this knowledge gap. Second, Beck overstates the erosion of nation states in world

risk society. There emerges a paradoxical point of world risk society. As Beck stated, Globalised risk situation does not lead to cosmopolitanisation, while risks exceed the capability of the nation states to deal with. Unlike Beck, I would suggest that risks do not lead to the failure of nation states, instead, they have caused transformations of nation states whose roles on the global stage are changing. Nation states have still played important roles in producing knowledge about Covid-19 vaccines to deal with risks, and making decisions about the uses of the vaccines. This has caused multifaceted forms of dependencies, including international dependency, global dependency, the interplay between global dependency and international dependency. The production of the AstraZeneca vaccine has transformed some nation states to the position of regional hubs.

I am in agreement with Brenner in that, “the territorial state remains a significant geographical infrastructure upon, within, and through which this multi-scalar dialectic of deterritorialisation and reterritorialisation is currently unfolding” (Brenner 1999, 63). Risks from the pandemic involve deterritorialisation and reterritorialisation simultaneously. Apart from this, Beck discusses risks from the production of knowledge, yet he does not state out clearly causal factors of knowledge transmission. To better capture this, we can look back at Castells’s work on space of flows in which flows of technological communication and information have brought about the space of flows, while requiring space of places to construct activity and experience (Castells 1999).

Additionally, there are limitations of this review article. First, my article pays much attention to the roles of WHO as a global actor in dealing with risks from the Covid-19 pandemic than other global actors. This is because WHO had authority to declare Covid-19 as pandemic, produced global knowledge about the pandemic, and implemented measures to deal with risks. Second, this work was written in 2021, when Covid-19 spread globally, and different countries faced national lockdowns. Within this context, there is little information about vaccines preferences. Vaccines were regarded as solutions to risk situations during that time. Therefore, my review article leaves rooms for future studies to research the roles of other global actors, the politics of knowledge about Covid-19 vaccines in the current context of post-Covid-19, including changing in the awareness, and the preferences of

vaccines. Also, future researchers may be of interest in studying the co-production of knowledge about Covid-19 vaccines. Apart from being one of the regional hubs of AstraZeneca vaccine, future researchers may take Thailand as an example of appropriating knowledge about Covid-19 vaccines, and conduct comparative analysis across different countries to further understand the roles of different nation states and local actors.

### Concluding remarks

Beck's theory, to some extent, can be extensively employed to conceptualise the geography of globalisation during the Covid-19 pandemic. Based on Beck, risks exist in terms of the scientific knowledge. Risks and knowledge are thus inextricably intertwined. The production of knowledge helps to identify risks, interpret risks, dealing with risks and minimise risks. In the case of Covid-19 pandemic, the roles of producing knowledge about Covid-19 vaccines centre upon a global actor (WHO) on the one hand, and national actors in manufacturing vaccines, and making their decisions about the uses of the vaccines to minimise risks on the other hand. As a result, geography of globalisation in the context of Covid-19 pandemic manifests forms of dependency, including international dependency, global dependency, and even the interplay between global dependency and international dependency in which middle and lower-income countries rely on the production of knowledge about Covid-19 vaccines. Also, this can transform the roles of the nation states to be regional production hubs of AstraZeneca vaccine.

To think further, Covid-19 vaccines have contributed to the problems of dependency on the international stage. The ability to access Covid-19 vaccines is unequal. Countries that are able to access vaccines, and distribute them equitably are likely to subject to a lesser degree of risks than those that are struggling with this. It implies that the former holds superior positions to others on global stage in dealing with risks.

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