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## Huawei at Bay? A View on Dependency Theory in the Information Age

Laura Kirste and Dirk Holtbrügge

### 1 Introduction

Surgeons working from home, cars that no longer crash, people experiencing situations that are actually taking place miles away—examples that seem like a sci-fi movie script will become true with 5G. The newest generation of the Universal Mobile Telecommunications System (UMTS), 5G, is a technological revolution that will allow data transfer so fast that it will feel like real-time due to its extremely small latency period. While smartphone users may perceive 4G/LTE as very fast, there is still a considerable lag between sending data and receiving it. Therefore, 5G is more than just the next standard of mobile communications, it will virtually eliminate lag, giving humans endless possibilities to bridge geographic space in close to real-time. By linking potentially any object with one another, a big network of communicating devices is shaped—the

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L. Kirste (✉) • D. Holtbrügge  
Department of International Management, Friedrich-Alexander University of  
Erlangen-Nürnberg, Nürnberg, Germany  
e-mail: [laura.kirste@fau.de](mailto:laura.kirste@fau.de); [dirk.holtbruegge@fau.de](mailto:dirk.holtbruegge@fau.de)

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Internet of Things (IoT). For example, a surgeon could transfer his movements directly to an operation robot. This way, it would not matter if patient and physician were in the same room or not. They would not even necessarily have to be in the same building, city, or even on the same planet. Another example is self-driving cars that would be communicating with one another constantly, not only avoiding accidents, but also optimizing the transportation system—for example by predicting peak times and interacting with traffic lights.

Naturally, with technology this powerful come security concerns, as it can also be used for socially less desirable means, such as espionage, manipulation, or war. This fear has recently sparked a global debate on the 5G network expansion and the companies involved in it. One of the biggest manufacturers of 5G components is the Chinese multinational enterprise (MNE) Huawei (IPlytics 2019). Through an early adopter strategy and rigorous research and development (R&D) investment, Huawei has managed to sell components around the world. Although the company claims to be owned by its employees, its ties to the Chinese government have been a topic of discussion, not least due to the opaque ownership structure. Recently, allegations of espionage by the Chinese government through devices developed and manufactured by Huawei have emerged and escalated, especially in the USA (Zhong 2019a). The technological lead that Huawei has over other competitors in the telecommunication business has resulted in fear of espionage and cybersecurity-related concerns. This fear is both rooted in the lack of understanding of the technology incorporated in Huawei's devices and the non-transparent ties of the company to the Chinese government. Following these allegations, the USA has recently imposed a ban and added Huawei to the blacklist, which forces all US-American firms to suspend any business with Huawei without official permission (Shepardson 2019). The USA has been making efforts to persuade other states to follow their initiative and ban Huawei from their 5G rollouts (Emmott 2019).

The case of Huawei shows how technological leaders can get into the crossfire between governments, rendering them cue balls in an international trade war that apparently goes way beyond single businesses and their authorization. Building on Vernon's (1971) extension of dependency theory, this book chapter aims to analyze the dynamic power

asymmetries of governments and multinational corporations in the Huawei case. The analysis will contribute to our understanding of dependency theory in a globalized world and highlight its relevance in the context of fundamental technological innovations such as 5G.

## 2 Sovereignty at Bay in the Age of Digitalization

Vernon's (1971) notion of MNEs as a driver for power asymmetries on a national level and loss of sovereignty of single countries is grounded in dependency theory. This school of thought arose in the 1950s and has commonly been used to explain national differences in economic development. The main notion of dependency theory is that underdeveloped nations are positioned in the periphery of the global economy. Since these nations typically offer low-cost labor and are rich in raw materials, they would put these goods up for sale on the world market. Developed nations have the means, that is knowledge and technology, to transform labor and raw materials into finished goods, which they in return offer on the world market. As these goods are desired by all societies, underdeveloped nations wind up purchasing them at high prices. Due to this dynamic, underdeveloped nations spend capital on finished goods, which otherwise would have been invested in R&D activities. This leads to a vicious cycle, keeping developed (or rich) nations in the center of the global economic circle and underdeveloped nations at the periphery with no way of piercing the inner sphere. According to this, underdeveloped nations would stay dependent on developed states forever (Ghosh 2019).

Globalization and the continuous reduction of trade barriers, however, have caused the global economic circle to close ranks. International trade has evolved from shifting finished goods to intermediate trade. Subsequently, R&D activities can be outsourced and trade with knowledge-intensive assets (e.g., patents) has increased (Lin et al. 2018). A very prominent example of a nation that has seemingly managed to move from a provider of cheap labor and raw materials to a nation rich in innovation is the People's Republic of China. In his seminal work, Vernon

(1971) states that the root of this phenomenon lies in the emergence and nature of MNEs. While nationally operating companies are subject to the legal and political environment of the respective nation, and are therefore controllable by the state, MNEs operate in many nations at once, subjecting them to a variety of legal and political systems. According to Vernon (1981), sovereignty is consequently “at bay” since MNEs have global interests and can therefore never respond to one single nation’s jurisdiction as this may threaten their international success. However, the MNE’s network-like nature makes it prone to serve as a channel for states to exert power over other states. Based on this argument, Kobrin (2001) discusses three challenges states are confronted with in regard to MNEs. While national jurisdiction is inherently bound to geographic borders, the MNE and its network structure lead to a jurisdictional asymmetry. This results in jurisdictional overlap and underlap, and finally to “a weakening of national control over the economy and economic actors” (Kobrin 2001: 186). What can be observed here is a conflict between cost and benefit of the MNE as an entity—for one, it seems to limit national control and threaten states’ power monopoly. At the same time, however, MNEs pose powerful tools for states to extend their influence across national borders by exploiting the MNE’s hierarchy. Through the national headquarters, states can exert power on foreign subsidiaries, thereby taking influence on other states within their own jurisdiction.

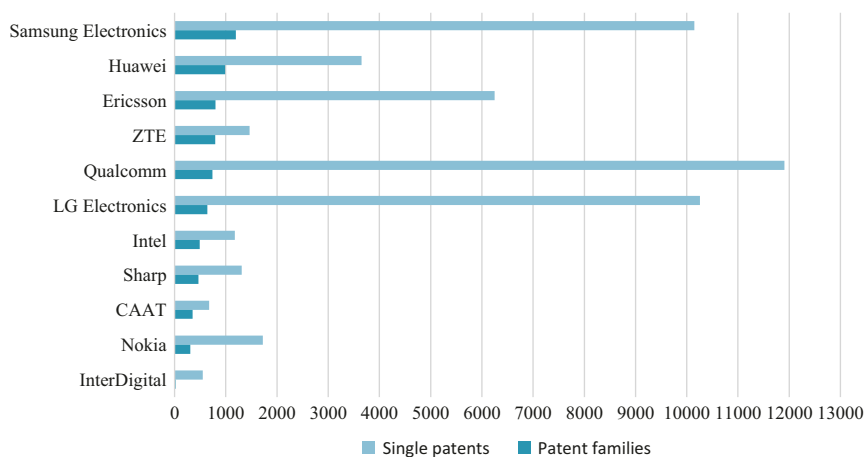
The Internet is the technological equivalent of an MNE. Its network structure subjects it to a large variety of jurisdictions, simultaneously making it almost impossible for single nations to subject it to only their laws, values, rules, and norms. While MNEs reflect certain economic interests and values held by their principals and agents, the Internet is a product of the social values and interests of the engineers who implement its infrastructure (Bradshaw and DeNardis 2018). The same is true for the 5G network of the future, but to an even larger extent. 5G technology has the potential to connect virtually any area of life with another, including critical infrastructure such as healthcare, connected utilities, transportation, or power line communication (IEEE 2017). When and how nations employ 5G technology will not only determine their economic power position for decades to come, but also have great influence on their sovereignty over other states, their independence, and their

political power. Those developing and supplying the network infrastructure are the ones whose values it will reflect, disregarding geographical borders and jurisdictions (Hoffmann et al. 2019). As a conclusion, those MNEs building and controlling these networks will have a significant influence on what the 5G technology of the future will look like. The norms and values of an MNE are significantly influenced by its home country. The stronger the ties between the MNE and the national government, the larger the influence that state can exert through the network of the MNE. Consequently, the more control the state exerts on 5G technology MNEs, the larger their power and influence over other states will be in the future.

### 3 A Brief Status Quo of Huawei's 5G Efforts

Like all wireless communication systems, 5G is vulnerable to cyber-attacks and therefore poses great security-related challenges that need to be managed. It will connect infrastructure that is critical to societies' safety as a whole, such as power supply systems (Ahmad et al. 2017). It is therefore vital for nations to guard their systems from unauthorized access by third parties. This could not only lead to data theft and leak of critical information, but to severe threats to national peace, such as cut-off from energy sources or failure of supply chain systems and resulting shortage of goods. Consequently, there is a great need for absolute trust in companies that supply, manage, and run 5G systems. Those that provide wireless wide area networking are the carriers. At this point in time, the leading carriers within a state are typically regional-based companies, e.g., Deutsche Telekom in Germany, T-Mobile U.S. Inc. and Verizon in North America, or China Mobile and SK Telecom in Asia (Townsend 2019). Carriers partner with infrastructure companies who supply them with the necessary equipment for implementing 5G rollouts.

In 2019, the Chinese corporation Huawei Technologies Co. Ltd. is the second most important holder of 5G patent families after South Korean Samsung Electronics and before the Swedish company Ericsson (Fig. 13.1). The transformation of the networking telecommunications industry through fast innovation has created a "dramatically new and



**Fig. 13.1** Amount of 5G patents of leading companies globally in 2019. (Source: Authors' illustration based on IPlytics 2019)

dynamic competitive environment, from which Huawei has become one of the most important firms” (Zhang and Alon 2010: 174).

As the company currently leading the race of providing 5G components, Huawei has secured over 50 contracts for 5G rollouts, roughly 60% of which will be completed in Europe (McGregor 2019; Tao 2019). Huawei currently employs about 188,000 people who are simultaneously the exclusive shareholders of the company, according to official company information (Huawei 2019b). Huawei operates 36 joint innovation centers and 14 R&D institutes, centers/offices (Huawei 2019b). According to its annual report, 45% of workforce is employed in the R&D sector and R&D expenditure accounted for 14.1% of total revenue in 2018 (Huawei 2019c). From 2009 until 2018, Huawei has invested roughly US\$70.4 billion in R&D activities ranging from smart devices to 5G components (Huawei 2019a). In comparison, smart devices manufacturer Apple has invested around \$63.4 billion in R&D in the same period of time (Apple 2018) and 5G technology competitor Samsung has invested \$117.5 billion (Samsung 2019a). Undoubtedly, Huawei's growth over the last decade is not only a product of its innovative strength, but also of China's entire digital strategy.

## 4 The Battle for the Core: An Analysis of National Interests and Positions in the Huawei Case

The prevailing approach to digitalization in many Western countries, such as the USA, the UK, Germany, and France, was born into “a rule-based capitalistic system that relies on verifiable public information and accepted legal processes” (Alon 2003: 246). It has been informed by the idea of collaboration, open innovation, and open-source software development. One example is the smart devices operating system Android, which originated from an alliance of several companies led by Google and is published as an open-source platform, i.e., as a software adaptable to the respective manufacturer’s device (Android and Google LLC 2019). This approach was implemented to establish secure operating systems as the open-source character makes it extremely difficult to add software code for deviant purposes such as espionage, data theft, or unauthorized device access. Western countries, with their traditionally strong focus on liberal values, have been pursuing a joint network. Analyzing this approach from the theoretical perspective, it can be characterized as forfeit of sovereignty of the single state over the Internet. The globally spanning network makes it extremely difficult for single countries to enforce jurisdiction and censorship. This, however, can be seen as a reflection of traditional Western values, such as freedom of information and press.

On the other hand, the Chinese approach to digital networks is very mismatched with these Western perspectives. While the Internet was long dominated by US-American firms such as Alphabet Inc. (Google), China sealed its version of the Internet off from the rest of the world by the Great Firewall, which creates a national intranet for Chinese access only and simultaneously blocks the majority of foreign Internet sites and applications (such as Google services, social media, etc.). The Great Firewall, established since 2003, keeps over 600 million users behind “the world’s most sophisticated and pervasive censorship system” (Ensafi et al. 2015: 61). However, this firewall does not only keep users from accessing

an uncensored version of the Internet—it also restricts access to the large Chinese market for foreign firms, strengthening Chinese companies' position and giving them an advantage through economies of scale in the home market. Furthermore, the Chinese government has been implementing a national-scale innovation strategy since 2006, which is backed by government subsidies and R&D investment (Kaska et al. 2019). In addition to the continuously successful implementation of this strategy, China has moved from being an imitator in the tech industry to becoming a highly important innovator (Liu et al. 2012). The foundation of this development is laid by demand-driving factors, such as rapid economic growth and an ever increasing consumer income (Yip and McKern 2014). Simultaneously, the establishment of price ceilings for products and the selective grant or withdrawal of rights to sell for foreign MNEs has put domestic companies at an advantage (Rottig 2016). Evaluating this approach through the lens of extended dependency theory (Vernon 1971), it can be seen that China has opted for a sovereignty-preserving approach. This is achieved by restricting the access reciprocally—Chinese users cannot access the World Wide Web and, simultaneously, foreign users are kept from penetrating the Chinese Intranet. Consequently, this mechanism gives the Chinese government power over information flows and allows for a high extend of control and influence.

China has been working on establishing a data-driven society, a meritocracy that rewards those that obey and punishes those that do not follow the rules (Rühlig et al. 2019; Bell 2018). This has become clear since at least the establishment of the Chinese Social Credit System, which, fed with big data on virtually everyone, does not only calculate scores for Chinese citizens and companies, but also for foreign firms (Giesen 2019; Stevenson and Mozur 2019). This state-surveillance infrastructure is characterized as “state-sponsored and big data-enabled surveillance efforts that are increasingly instrumentalized by state powers to surveil and regulate the political, economic, and social dominions” (Liang et al. 2018: 416). Moreover, China's Internet politics are characterized by opaque relationships between private and public entities. These non-transparent ties between the government and MNEs make it extremely difficult, if not impossible, to distinguish between the MNE's motives



and those of the Chinese government. While dependency theory argues that no state has full control over an MNE due to its diverse set of interests in different jurisdictions (Vernon 1971), this may not apply to some Chinese MNEs. This strategy has made it hard to believe for foreign firms and governments that Huawei, which has been denying ties to the Chinese government, is in fact an independent entity. Huawei's ties to the government are uncertain to this date—opaque.

In business research, the term opacity refers to the lack of credible company information for stakeholders, which occurs when a company does not disclose information, or available information cannot be validated (Bushman et al. 2004; Li et al. 2019). This lack of transparency can lead to exclusion of the respective company from business activities such as mergers and acquisitions. As Li et al. (2019) show in their recent study, this is an especially great liability for Chinese state-owned firms.

Huawei has stressed on numerous occasions in the past years that it is not affiliated with the Chinese government (Zhong 2019b). While the official statement of Huawei, as can be read on their website, asserts that Huawei is 100% owned by its employees (Huawei 2019b), Balding and Clarke (2019) paint a very different picture. According to their study, “the Huawei operating company is 100% owned by a holding company, which is in turn approximately 1% owned by Huawei founder Ren Zhengfei and 99% owned by an entity called a ‘trade union committee’ for the holding company” (Balding and Clarke 2019: 2). The exact structure, ownership, and tasks of this committee is entirely unclear, leading to the conclusion that the ownership of Huawei is entirely unknown. One approach for companies to reduce opacity, especially lack of transparency of ownership structures, is to become publicly listed on foreign stock exchange (Li et al. 2019), a step that Huawei has not taken so far.

Ownership-related opacity has led to Huawei's exclusion from important markets. Consequently, the line between the classification of being a state-owned or private-owned firm becomes blurred (Cuervo-Cazurra 2018). The USA have imposed a ban on Huawei due to legislators' consideration of the firm being under the influence of the Chinese government and are urging other countries they foster diplomatic relationships with to do the same (Barnes and Satariano 2019; Booth et al.

2020; Zöttl 2020)—ostensibly due to security-related concerns. While some countries, such as Australia, have followed the USA's advice and imposed bans on Huawei specifically or Chinese firms in general (Hoffmann et al. 2019), other countries are reluctant to do so. Very recently, the German government published its security checklist for the advancement of 5G network expansion. Contrary to expectations, the paper does not explicitly exclude Huawei, or other companies for that matter, from participating (Zeit Online 2019). The paper is even toned down when it comes to trustworthiness of suppliers of 5G components. While an earlier version of the paper clearly stated that suppliers must be trustworthy, the now newly published version only specifies that suppliers must ensure trustworthiness by making a statement—a crucial difference, which allows the conclusion that there is, at least to some degree, awareness of some suppliers potentially not being able to pass extensive tests of their trustworthiness. While the USA is headquarters to a very successful 5G component manufacturer, namely Qualcomm who currently holds 11,907 5G patents (IPlytics 2019), Germany is in a less comfortable position. Germany that has long profited from its strong position in the economy of exports has failed to invest in 5G technology in a timely manner. Consequently, the country now finds itself in a cross-fire between the USA on the one side, fiercely fighting Huawei and its global expansion, and China on the other side, enabling a fast and cost-effective entrance into the 5G network.

In his speech during the Munich Security Conference in February 2018 then German foreign minister Sigmar Gabriel (2018) argued:

China's rise will result in a massive shift in the balance of power. The initiative for a new Silk Road is not what some people in Germany believe it to be—it is not a sentimental nod to Marco Polo, but rather stands for an attempt to establish a comprehensive system to shape the world according to China's interests. This has long since ceased to be merely a question of economics. China is developing a comprehensive systemic alternative to the Western model that, in contrast to our own, is not founded on freedom, democracy and individual human rights.

Similar to its new Silk Road initiative, China's aggressive strategy to contribute substantial parts to the global 5G rollout is a symptom of the global battle for the core of economic welfare in the digital age. Western powers, such as the USA and the European Union have long understood themselves as ambassadors of liberalism, free trade, human rights, and democracy. While there are some legitimate cyber-security-related indications published by the UK's HCSEC report that Huawei actually lacks good security practices and the equipment manufactured by the company has several serious shortcomings (Hoffmann et al. 2019), the USA's initiative to ban Huawei is additionally rooted in protectionist motives and power-related concerns. For example, Japan has banned Huawei and ZTE from participating in their national 5G rollouts, officially due to security concerns (Kyodo 2018). However, it should be kept in mind that Japan's 5G component manufacturer Sharp currently ranks eighth in the patent race and it may not be too farfetched to assume that Japan is retaliating upon China for their own protectionist measures by blocking up access to the Japanese market.

Generally, the interests in the Huawei case are threefold. Firstly, there might be legitimate security concerns related to Huawei's internal practices and gear (Hoffmann et al. 2019). Simultaneously, the smart devices industry has had several cases of security issues. Most recently, Samsung had to address a major fingerprint recognition issue in their smartphones that allowed unauthorized access to smartphone devices by their brand Galaxy (Samsung 2019b). However, security concerns related to 5G rollouts are extremely sensitive due to the large scope of application across areas of life, industries, and society as a whole. Secondly, there are concerns that the Chinese government might exploit Huawei's 5G participation in other countries' 5G network for their own interests. Espionage has been a growing concern, especially with regard to China's establishment of the Social Credit System. Furthermore, 5G technology will connect vital national resources such as power supplies, which is why fear of meddling is a legitimate issue that needs to be addressed. However, this is the case for all nations. Those who are home countries to the MNEs supplying 5G gear will inevitably come under suspicion of data theft,

espionage, and unauthorized interference. Simultaneously, those who are unable to task domestic MNEs with the 5G rollout may forever be haunted by paranoia if they cannot trust that their supplier shares or at least respects the values their network shall reflect. In practical terms, Huawei's 5G gear is feared to reflect the Chinese approach to digitalization, for example by enabling espionage or gathering data in order to gain advantages and control over other states.

At the same time, those countries that have failed to become early 5G adopters like South Korea and China did, are under pressure to secure their position in tomorrow's global economic system. Being able to move fast has now become more important than ever, pressuring countries to move forward. However, considering recent events, this does not seem like enough to disregard the ongoing security debate—while German carrier Deutsche Telekom had stated in January that a ban would lead to Europe lagging the USA and China an estimated two years (Donahue et al. 2019), the company just announced its plans to exclude Huawei equipment from their 5G rollout within the next two years (Berke and Wettach 2019).

## 5 Conclusion

Vernon's (1971) extension of dependency theory illustrates impressively how 5G technology has become the new battleground for power and welfare today. In the "battle for the core," late-adopter countries need to make tough calls whom to depend on and, more importantly, whom to be reliant on. Inherently to its nature, the 5G network threatens national control over important resources. Combined with the nature of the MNE, which can be a tool for states to exert power across their boarder, the 5G network expansion questions the current distribution of power in the digital age.

The case of Huawei demonstrates that countries that fail to keep up with technological innovation will forfeit their sovereignty over network participants at least partially. The nature of 5G technology and the general trend of evermore increasing interdependence of physical and virtual

space have caused non-producing states to find themselves at crossroads. Huawei, a symbol for China's digital innovation strategy with opaque ties to the Chinese government, poses both a threat and opportunity to those who have failed to innovate for 5G at an early stage. These latecomers now require a strategy to position themselves in the digital future, to secure welfare, and to control foreign access to their networks.

With two of Huawei's major competitors, namely Ericsson from Sweden and Nokia from Finland, the European Union does have local manufacturers to supply 5G components to carriers. However, Huawei has been benefitting from enormous economies of scale and scope within China due to governmental support, subsidies, and unlimited access to the largest markets. This has led to Huawei being able to establish itself not only as a competent, but also fast and cheap supplier. As many countries in Europe have already been using Huawei's components for their network, it would cause losses if these components needed replacement by other suppliers (Townsend 2019). Nevertheless, the security aspects still play a vital role in nations' decision-making whether or not to include Huawei in their rollout. In order to stay competitive in foreign markets, Huawei might need to take additional measures to enhance their global image. Sooner or later, Huawei will need to address the allegations of espionage and reveal their ownership structure and proposed ties to the Chinese government at least partially. Certainly, becoming a publicly listed enterprise would help in European and American markets (Li et al. 2019).

In conclusion, we can see that Huawei is both the beneficiary and victim of protectionist actions. While the Chinese digitalization strategy has helped Huawei's growth and internationalization through subsidies, arranged joint ventures, and further efforts to integrate telecommunication equipment innovation into domestic firms rather than relying on imports (Zhang and Alon 2010), it has also sparked mistrust in important international market environments. Furthermore, protectionist measures of other countries to advance their domestic companies' competitiveness has led to a partial exclusion of Huawei.

The development and implementation of 5G networks seems to move the globalized world further apart instead of closer together—ironically.

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