Institution: Brunel University London		
Unit of Assessment: 17 Business and Management Studies		
Title of case study: Application of co-technology through co-creation in the electric vehicle industry in Bangladesh		
Period when the underpinning research was undertaken: 2015 - 2020		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s): Dr Bidit Dey	**Role(s) (e.g. job title):** Reader	**Period(s) employed by submitting HEI:** 08/2014 – present
Period when the claimed impact occurred: February 2019 to present		
Is this case study continued from a case study submitted in 2014? N		

1. Summary of the impact (indicative maximum 100 words)

In response to Dr Bidit Dey's research on co-creation in mobile telephone industry, the Bangladesh Government has confirmed that they are applying key research findings in their current and future policies in supporting the electric vehicle industry. The empirical and conceptual contribution of Dr Dey's research on mobile telephone industry in Bangladesh has profound implications on the electric vehicle industry as the latter can be supported by creating a bricolage of support SMEs, involving NGO sectors and initiating vocational training.

2. Underpinning research (indicative maximum 500 words)

The use of various forms of ICTs (information communication technology) such as mobile telephones can foster the socio-economic progression of developing countries. Contextually appropriate designs and usages are needed for ICTs to deliver value to various parties within the socio-economic spheres of developing countries that have different needs and wants compared to those of the developed world. Sustainable design and development of smartphone industries in the developing world, and their contribution to socio-economic wellbeing, has drawn significant research attention.

Dr Dey (then, Senior Lecturer) has been researching on this area for the last 5 years to explore how various stakeholders symbiotically interact and create value in developing countries (Ref.1; Ref. 2; Ref. 4), where large multinationals have limited access and engagement. In his work, he has explored and analysed various factors and their inter-relationships that initiate, support and disseminate technological innovation. Drawing on the theoretical lens of co-creation of value, his research examines how technology upgrading is achieved in the context of a developing country such as Bangladesh. He has examined the issue in multiple contexts including Bangladeshi and Indian mobile telephone industries (Ref. 2; Ref. 4; Ref. 5) and mobile banking sectors (Ref. 1). His research on Bangladeshi farmers' use of mobile telephones (Ref. 5) and South Asian consumers' engagement with social media (Ref. 3) offers useful insights into consumers' engagement with small and large businesses. Dr Dey co-edited a monograph (Ref. 6) for Palgrave McMillan that push the boundaries of technology mediated development for under privileged communities.

Bricolages, constituted by SMEs with or without direct support from large multinational corporations, are a significant aspect of the surge in telecom industry. As Dr Dey's research

found, the role of not for profit organisations and their partnership with other stakeholders such as vocational institutes and small entrepreneurs drives innovation. However, this nature of collaboration and collective endeavour to foster sectorial development is not distinct to the telecom sector only, albeit the manifestation of this particular attribute is quite remarkable in that sector. It is closely linked with the underlying principles and philosophies that characterise the business culture in Bangladesh. As such, Dr Dey's research suggestion to support SMEs and encourage other stakeholders (for example, NGOs and vocational institutes) to collaborate with a view to trigger a bottom up approach to sectorial development is highly palatable to the nascent electric vehicle industry in Bangladesh.

Dr Dey's research suggests technology upgrading can be achieved even without some of the key prerequisites such as financial, institutional or infrastructural facilities cited in existing literature. On his various research projects, he conducted interviews with industry experts, SME owners, senior corporate executives of large enterprises of Bangladesh and India and extracted data from secondary sources (social media, company reports, newspapers etc.) to develop strong empirical evidence that was theorised to generate generalised conceptual underpinnings.

Dr Dey's research findings offer useful theoretical and policy implications by providing deeper understanding of the interactions and inter-relationships of those who have involvement in the value creation for mobile telephony and contribute to the development of effective business models and technological innovations for these marketplaces. The findings have broader implications that can be applied in other national and industrial contexts.

3. References to the research (indicative maximum of six references)

Ref. 1 Babu, MM., **Dey, BL.**, Rahman, M., Roy, SK., Alwi, SFS. and Kamal, MM. (2020) 'Value co-creation through social innovation: A study of sustainable strategic alliance in telecommunication and financial services sectors in Bangladesh'. *Industrial Marketing Management*, 89. pp. 13 - 27. https://doi.org/10.1016/j.indmarman.2020.06.003

Ref. 2 Rahman, M., Bose, S., Babu, MM., **Dey, BL.**, Roy, SK. and Ben, B. (2019) 'Value Co-Creation as a Dialectical Process: Study in Bangladesh'. *Information Systems Frontiers*, 21 (3). pp. 527 - 545. https://doi.org/10.1007/s10796-019-09902-4

Ref. 3 **Dey, BL.**, Sarma, M., Pandit, A., Sarpong, D., Kumari, S. and Punjaisri, K. (2019) 'Social media led co-creation of knowledge in developing societies: SME's roles in the adoption, use and appropriation of smartphones in South Asia'. *Production Planning and Control*, 30 (10-12). pp. 1019 - 1031. https://doi.org/10.1080/09537287.2019.1582106

Ref. 4 **Dey, BL.**, Babu, MM., Rahman, M., Dora, M. and Mishra, N. (2018) 'Technology upgrading through co-creation of value in developing societies: Analysis of the mobile telephone industry in Bangladesh'. *Technological Forecasting and Social Change*, 145. pp. 413 - 425. https://doi.org/10.1016/j.techfore.2018.05.011

Ref. 5 **Dey, BL.**, Pandit, A., Saren, M., Bhowmick, S. and Woodruffe-Burton, H. (2016) 'Co-creation of value at the bottom of the pyramid: Analysing Bangladeshi farmers' use of mobile telephony'. *Journal of Retailing and Consumer Services*, 29 (2). pp. 40 - 48. https://doi.org/10.1016/j.jretconser.2015.10.009

Ref. 6 **Dey, BL.**, Sorour, K. and Filieri, R. (2015) *'ICTs in developing country: Research, practices and policy implications'*. Palgrave Macmillan https://doi.org/10.1057/9781137469502

4. Details of the impact (indicative maximum 750 words)

The Government of Bangladesh has used key aspects of Dr Dey's research findings on ICTs and co-creation in the mobile telephone industry to shape their policies in supporting the electric vehicle industry (E1).

Bangladesh needs to find alternate sources of energy because the nation is running out of supplies. The country is already one of the world's most energy-poor countries, and there is a large gap between power supply and demand. In rural areas, only 42% of the population have access to electricity, and the Government has been struggling to boost production. As Bangladesh is also among the countries most vulnerable to the effects of climate change, it has vowed to use 100% renewable energy by 2050. However, the country is off track to meet that target.

The Ministry of Power, Energy and Mineral Resources of the Government of Bangladesh is determined to change this. In 2018, the State Minister confirmed that the Ministry "has received useful insights and practical implications" from Dr Dey's research on ICTs and co-creation, which will inform the implementation of policies in the energy sector.

As the Government of Bangladesh is now undertaking detailed plans for supporting electric vehicles, the empirical and conceptual issues highlighted in Dr Dey's research have generated significant interests. The Government has used Dr Dey's research in strategies and policies designed to support the growth of the electric vehicle industry in Bangladesh. As such, a letter (E1) has been issued commending the research and acknowledging its relevance and contribution.

Further to the letter issued by the State Minister, the Government's Department (commissioned to assess policies and regulations to run and monitor projects in the energy sector), acknowledges that there is strong ground to promote bottom up sectorial and technology development in the electric vehicle industry, as a result of the key research insights from Dr Dey.

By the middle of 2019, Bangladeshi local firms have pledged to set up a plant worth USD200,000,000, equivalent to GBP153,820,000 (11-2020), to assemble all-electric and hybrid vehicles indicating the prospect of growth in this area. Now, the country imports most electric third-wheelers from China and India, but if the country wants to be more self-sufficient energy-wise, it needs to resource local capabilities. However, the country has limited infrastructure for maintenance to the electrical systems, battery recharging and servicing of electric vehicles, which are often different from those of fossil fuel driven vehicles.

In light of this local investment, Dr Dey's research recommendations have shown the Government "how SMEs co-create a bricolage of innovative services in a country like Bangladesh that has limited operations of large multinational corporations" (E1). The research has provided the Government with the understanding that they need to collaborate with the 135 petrol pumps and 500 registered garages and vehicle repair centres in Dhaka in addition to relevant entrepreneurial ventures, because their contribution to the collective development of this industry is immense. Dr Dey's research has found that collaborating and engaging with them is imperative in order to understand the nature of their business and develop effective ways to integrate them within a broader industrial boundary.

Furthermore, as Dr Dey's research indicated, there is a dearth in vocational training on this engineering expertise in Bangladesh which is a major impediment for the development of

relevant expertise and skills. Skills and expertise are often informally transferred and there is a lack of organised method for sustainable development of expertise. Following these research findings, the Ministry of Power, Energy & Mineral Resources, has changed its aims and now wants “to involve NGOs, initiate training programmes for small business entrepreneurs, and promote dialogue and cooperation among all concerned stakeholders to formulate effective policies” (E1).

“For a developing country like Bangladesh that has perennial energy crises and increasing level of pollution, the availability of electricity in the remotest areas of the country, would bring about significant economic and environmental benefits” (E1). Becoming a more energy-sufficient country with the support of Dr Dey’s research will prepare Bangladesh for global-level competition, and this preparation will be an important factor for success in the future, both in terms of economic and environmental progress.

Dr Dey’s research has made a significant contribution in clarifying the points the Government needs to consider in this undertaking and has served a significant piece of reference in formulating and improving their policies for the electric vehicle industry in Bangladesh.

5. Sources to corroborate the impact (indicative maximum of 10 references)

E1 Letter from the State Minister of Power, Energy and Mineral Resources, Government of Bangladesh, dated December 2018
E2 Letter from the State Minister of Power, Energy and Mineral Resources, Government of Bangladesh, dated March 2020 (unavailable because of COVID-19)