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The 4th Industrial Revolution and SMEs in Malaysia and Japan: Some Economic, Social and Ethical Considerations

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As always in discussions of economic change, the choice of metaphors matters greatly. Today, two seem to be competing for our attention; the Fourth Industrial Revolution (4IR) and Industry 4.0 (In4.0). In origin, the term Industrial Revolution is a borrowing from politics, specifically from events in France between 1789 and 1793, and is highly dramatic in tone; it implies a process of sudden, rapid, radical change, one that is extremely divisive socially; liberating in the eyes of its proponents, destructive in those of its adversaries. In4.0 appears at first glance much less traumatic, and comparatively lacking in glamour; it is a software program upgrade, a consumer product similar but better than its predecessors, an improvement on an existing model, essentially unthreatening, designed to be user-friendly. Yet there is a sting in the tail. Why the 4.0? According to those who first popularised the phrase In4.0, 'The first three industrial revolutions came about as a result of mechanisation, electricity and IT. Now, the introduction of the Internet of Things and Services into the manufacturing environment is ushering in a fourth industrial revolution' (Kagermann, Wahlster, & Helbig, 2013, p.6). So we are back firmly in the world of revolution. But even if it seems that 4IR and In4.0 are in fact intended as synonyms, the metaphorical difference in emphasis between them is still important, because it prompts some fundamental questions. How genuinely new and different is the 4IR/In4.0? Is it being oversold? Are we witnessing the early stages of a radical break with the past similar in scale to the changes that occurred in Britain between c.1750 and c.1850, or is what is happening less than that, an incremental change, essentially a sub-development of the IT revolution of the 1970s? And what timescale is involved? How far ahead are we supposed to be looking? A matter of a few years, or many decades? Finally, in what proportions will the 4IR/In4.0 prove benign or malevolent? Do the opportunities it offers outweigh the destruction that may ensue?

To answer these questions, we obviously have to decide whether what we are currently dealing with is a genuine IR or not. To determine this, some kind of yardstick by which to assess it is needed, and this can only be offered by the past.

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There are many views of what, historically, has constituted the essence of an IR, though all accept that it is a long-term process, not a sequence of short-time events. One can opt to focus

primarily on energy, on new sources of power, in which case there have been only two IRs to date. So for Jänicke and Jacob, 'The transformation from an agricultural-based society to an industrial society, which began in England at the end of the 18th Century, was initially inseparable from the development of coal as an energy source. In the 1920s this revolution continued with the use of oil and electricity' (2009, p. 1). In this context they look to the future by citing the words of José Barroso, President of the European Commission, who in a 2007 speech proclaimed, "I believe we are now standing on the brink of a Third Industrial Revolution: the Low Carbon Age. Like the previous industrial revolutions, this will be driven by technology and new forms of energy. It will also transform our societies". According to Jänicke and Jacob, such an IR (only the third in the sequence, it should be noted), would be a "green industrial revolution", an "efficiency revolution" and a fundamental transformation towards "green capitalism" (2009, p. 3). We might note in passing that nuclear power, once heralded as the ultimate technological achievement in this field, appears to have been airbrushed from both history and the future in this reading of events. If this proves to be correct, then it is a stark warning about how difficult it is to identify what constitutes significant technological change.

More recently, other economists and economic historians have chosen to concentrate on the appearance of one or more General Purpose Technologies as the hallmark of an IR. At first glance this seems appropriate for key breakthroughs like the steam engine, the gasoline engine, the electric dynamo and the computer. But, as Field has pointed out, while 'the concept and its associated criteria were intended to catch "big", "important", "revolutionary" innovations' (2008, p. 16), many iconic machines and processes central to the narrative of the first IR cannot, by definition, be termed GPTs. 'Take textile inventions such as the cotton gin, the spinning jenny, the water frame, Crompton's mule or the power loom… they were not general purpose. They remained single or limited purpose. The cotton gin was used to clean short staple cotton. That's it. It was of no use in the preparation of wool, flax, silk, or even long staple cotton fibers…there is no way we can call the cotton gin a GPT. And the same is true for the spinning jenny, water frame, mule, or many of the innovations underlying the advance of the British iron industry, such as Darby's coke smelting, Cort's puddling, or Nielsen's hot blast, or the steel innovations of the second half of the nineteenth century (Bessemer converter, Gilchrist-Thomas process, or Siemens-Martin open hearth furnace)' (2008, p. 14). In addition, it is unclear exactly where developments in transportation like the jet engine, or in the organization of production, like the assembly line, are to figure on any GPT list. Finally, there is the vexed question of how to relate any GPT to its unique and dynamic social and cultural environment. A sense of both the degree of complexity and the vagueness involved in trying to map such a relationship can be gleaned from a recent fishbone diagram created by Mario Coccia (2017, p. 9).

Yet even if we set aside all of these reservations, it is still unclear if the notion of an IR driven by a new and universally recognized GPT can be identified in the present. One of the promises seemingly inherent in the 4IR is a surge in total factor productivity (TFP) growth, brought about by the efficiencies of automation. But rather than view this as the onset of a new phenomenon, it is quite possible to interpret it simply as one among many of the longer-term effects of the 3IR, and to draw a parallel here with developments in the 2IR. David and Wright

(1999) discussed this when examining 'the analogies and contrasts between the modern experience of the information and communications technology (ICT) revolution, and the historical case of a socio-economic regime transition involving the electric dynamo [in the U.S in the 1920s] (p. 4). Of course there is an obvious problem here. One can readily compare the adoption of the electric dynamo and the personal computer, as Wright and Davies do, but neither is a GPT. To shift to that level, one would have to compare electrification with ICT, a far more extensive and complex task, as they do when arguing that 'the extent of 'computerization' that had been achieved in the whole economy by the late 1980s was roughly comparable with the degree to which the American manufacturing sector had become electrified at the beginning of the twentieth century' (1999, p. 16).

Allowing the dynamo and the p.c. to act as proxies for much larger forces, though, does mean that we can avail ourselves of other insights of David and Wright. They draw attention to 'the marked acceleration of the pace of total factor productivity growth that occurred in U.S. manufacturing following World War I... After a 'productivity pause' of some three decades, during which gross manufacturing output grew at less than one percent per annum relative to inputs of capital and labor, TFP in this sector expanded at more than five percent per annum between 1919 and 1929…it contributed substantially to the absolute and relative rise of the US domestic economy's TFP residual, and in many respects launched the high-growth era that persisted into the 1970s.' (1999, p. 4). One factor behind this was 'the culmination of the dynamo revolution that had been underway as a technological trajectory since the nineteenth century, but which did not realize its engineering potential for major productivity gains until the 1920s' (1999, p. 6).

It might be more appropriate, then, to view the 'smart factory' now coming into view not as the embodiment of a 4IR, but as a phase of the 3IR equivalent to the diffusion of the dynamo in the 1920s. Perhaps, as with the dynamo, 'some of these sweeping innovations should be better viewed as sub-categories of deeper conceptual breakthroughs in a hierarchical structure' (1999, p. 10). After all, the consequences for the U.S. of the diffusion of the dynamo were still profound, for the 'package of electricity-based industrial process innovations…[of the 1920s] could well serve as a textbook illustration of capital-saving technological change. Electrification saved fixed capital by eliminating heavy shafts and belting, a change that also allowed factory buildings themselves to be more lightly constructed, because they were more likely to be single-story structures whose the walls no longer had to be braced to support the overhead transmission apparatus. The faster pace of material throughput amounted to an increase in the effective utilization of the capital stock. Further, the frequency of downtime was reduced by the modularity of the unit drive system and the flexibility of wiring; the entire plant no longer had to be shut down in order to make changes in one department or section of the factory' (1999, p. 7). In4.0. may well prove to be important for TFP growth, but this alone would not make it the 4IR: on such a view, present and future trends may constitute a period of acceleration, a depression of the pedal on a relatively straight road, as opposed to a sharp and sudden change of direction, a wrenching of the steering wheel onto a new course.

Deciding this question is complicated by the fact that a term as dramatic as the 4IR has

naturally attracted users from a wide variety of fields, some of whom staked their claim to it well before the birth of In4.0. Thus Liming Dai (2005) appropriated it to describe the advent of nanotechnology, which, defined as the facility 'to build materials and devices atom by atom, holds vast promise for innovation in virtually every industry and public sector, including health care, electronics, transportation, environment, and national security…[which means that] the development of nanotechnology will surely some day change the world. Sooner or later, drug delivery will be accurate enough to target specific proteins within cells. Solar panels will be powerful enough to replace fossil fuels as our primary energy source. Chemical sensors will be small enough and cheap enough to the scattered in public spaces, detecting toxins before any damage is done. We will all be using a new class of super-strength nanomaterials as siding for our homes, protection for our cars and even our clothing' (pp. 4, 9).

In fact, as has been pointed out recently, 'the phrase the fourth Industrial Revolution has been around for more than 75 years. It first came into popular use in 1940, in a document titled "America's Last Chance" by Albert Carr, to usher in "modern communications, merely as an additional manifestation of the industrial revolution—as the beginnings of a new phase, a 'fourth industrial revolution.' " … Since then, historians and scientists have proclaimed this "new" revolution's commencement with the arrival of atomic energy in 1948… Ubiquitous electronics in 1955… The computer age of the 1970s… All the way to the beginnings of our modern information age in 1984… The White House even hailed nanotechnology as the harbinger of "the next Industrial Revolution" (Garbee, 2016).

Such a pedigree for the term 4IR should also give us at least pause for thought before adding Industry 4.0 to an already extensive list, and while In4.0 undoubtedly claims to identify itself as the 4IR, there are major differences in scope and emphasis between the two concepts as they are currently used.

In4. 0 began life as a single country, competitive initiative concerned narrowly and exclusively with factory automation. The project' s website is unequivocal about this. 'INDUSTRIE 4.0 is the name given to the German strategic initiative to establish Germany as a lead market and provider of advanced manufacturing solutions. One of 10 "Future Projects" identified by the German government as part of its High-Tech Strategy 2020, the "INDUSTRIE 4.0" project represents a major opportunity for Germany to establish itself as an integrated industry lead market and provider' (GTAI, n.d.). From the unveiling of the concept by Professor Wolfgang Wahlster, Director and CEO of the German Research Center for Artificial Intelligence, at the 2011 Hannover Messe to the release of the final report of the Industrie 4.0 Working Group in April 2013, the character of the initiative as a joint government / industry project to promote the national interest remained unchanged, as it has since that time. Thus the following year, a GTAI report claimed that 'The conditions which make the fourth industrial revolution or INDUSTRIE 4.0 are unique to Germany. It is no idle boast that nowhere else in the world do the required conditions necessary for the fourth industrial revolution exist. This brave new world of decentralized, autonomous real-time production being pioneered in Germany has its basis in two things: Germany's continued role as one of the world's most competitive and innovative manufacturing industry sectors; and the country's technological leadership in

industrial production research and development' (2014, p. 4).

That such a narrow, nationalist focus does not characterise the concept of the 4IR today owes much, ironically, to another German, Klaus Schwab, founder and executive chairman of the World Economic Forum. The decision to focus its January, 2016, annual Davos meeting on the theme of the 4IR moved the concept from the national to the global stage. Of equal importance, though, was the launch of a much broader definition of the 4IR. As Schwab put it in his recent book on the subject, 'The fourth industrial revolution…is not only about smart and connected machines and systems. Its scope is much wider. Occurring simultaneously are waves of further breakthroughs in areas ranging from gene sequencing to nanotechnology, from renewables to quantum computing. It is this fusion of these technologies and their interaction across the physical, digital and biological domains that make the fourth industrial revolution fundamentally different from previous revolutions' (2017, ch. 1).

This far more extensive definition afforded scope for many of those attending the 2016 Davos meeting to shelter their own particular interests under the umbrella of the 4IR. Some were connected to 'smart and connected machines', if we extend these to include 3D printers; so MIT's Carlo Ratti such devices would reduce the dependence of cities on big supply chains since they would allow many items to be sourced locally. More generally, topics connected with sustainability, 'green economics' and social justice were allocated prominent places: Hiroaki Nakanishi, Chairman and CEO of Hitachi, advocated the integration of renewable energy sources into an overall smart grid, a theme also addressed by Naomi Oreskes of Harvard when looking forward to the demise of fossil fuels; Ellen MacArthur argued for the importance of circular economics; Stewart Wallis of the New Economics Foundation spoke in support of his 'new economic model'. But it was perhaps with the introduction of the 'biological' dimension that the elasticity of the concept of a 4IR reached breaking point.

The attempt at Davos to bring topics like artificial intelligence, the human genome, and brain research within the scope of the 4IR took the discussion from the realm of the industrial to something far more vague, 'what it means to be human'. It blurred the boundaries so much that participants often talked simply about 'the future' rather than the 4IR, and it extended the timescales of change, possibly to eternity, since many of the developments posited may turn out to be either extraordinarily difficult to achieve or extremely controversial, or both.

Much excitement was generated, for example, by talk of the possibilities opened up by current brain research, but little or nothing was said about the difficulties inherent in such research, as exemplified by the current travails of one of its flagship enterprises, the EU funded Human Brain Project. This initiative, the progeny of the neuroscientist, Henry Markram, was launched in 2013 and within two years was, in Stefan Theil's words, 'in disarray, facing controversy and even derision'. The root of the problem lay in Markram's basic objective, that of 'building a supercomputer simulation of the entire human brain… Many…critics disputed the basic science behind Markram's project. Even if it were possible, mainstream neuroscientists say, reengineering the brain at the level of detail envisioned by Markram would tell us nothing about cognition, memory or emotion—just as copying the hardware in a computer, atom by atom, would tell us little about the complex software running on it. Others accused Markram of

exaggerating the HBP's potential breakthroughs' (Theil, 2015). Despite such reservations, the EU was still prepared to commit €1 billion to the project, for reasons that had less to do with science than politics. 'Markram's brain on a supercomputer—and his promises of what it would achieve for neuroscience, medicine, robotics and computer technology—was a good fit for a bureaucracy that believed a 10-year, top-down plan for "disruptive" innovation was possible... Because the flagship program was envisioned as a showcase project outside the usual science-funding process—and because of the big budget that needed to be justified—politicians, bureaucrats and even scientists had strong incentives to exaggerate its promises' (Theil, 2015).

If the HBP is a cautionary tale about unrealistic objectives, then the Human Genome Project might have a similar use when discussing what happens if Big Science actually achieves its objects. As Patrick Heavey notes 'A May 2016 scientific meeting proposed a next stage in DNA synthesis: the Human Genome Project 2, which aims to write synthetic human genomes. Originally called HGP2: The Human Genome Synthesis Project, its name was changed to the less evocative HGP-Write: Testing Large Synthetic Genomes in Cells. The aim is to write a complete human genome within 10 years. If this succeeds, the next logical phase would seem to be the design of human genomes… Questioning the ethics of the project, another synbio pioneer, Drew Endy, asked: "Would it be OK, for example, to sequence and then synthesise Einstein's genome?" If it succeeds, and progresses to the design level, it seems plausible that it will advance medicine significantly. But could it be used for other purposes, including eugenics?' (2017, p. 209).

In the end, events like Davos 2016 may tell us more about what some members of the global elite would like to see happening than about what will actually happen. On balance, then, it seems safer, for the present at least, to exclude such areas from any concept of the 4IR, and indeed to be very cautious in using the concept at all, given that there is no universally accepted set of criteria available to test for the presence of an IR. Its existence can only be confirmed in hindsight.

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Given all this, it might be wiser to focus attention on the world of In4.0, and on the impact of advances in technology more generally, since these are already affecting the world outside the walls of the 'smart factory'.

In the case of universities, for example, technological developments already have far-ranging implications in terms of research agendas and collaborative programs with industry. Here, though, let us focus on teaching, and on the balance to be achieved between content and skills in the years ahead.

The WEF' s 'Future of Jobs Report' predicted that 'Overall, social skills—such as persuasion, emotional intelligence and teaching others—will be in higher demand across industries than narrow technical skills, such as programming or equipment operation and control. Content skills (which include ICT literacy and active learning), cognitive abilities (such as creativity and mathematical reasoning) and process skills (such as active listening and critical thinking) will be a growing part of the core skills requirements for many industries' (WEF, 2016a, pp. 22-23). How much of this will fall within the purview of universities is not made clear

by the report, but there are certainly changes in the offing for the tertiary sector, some incremental, others radical.

Incrementally, for example, the impact of technological innovation on the teaching of Business English will need to be addressed. Vocabulary is perhaps the most obvious area requiring attention, but the news terms that are being created by the 4IR will take their place in a developing Global English (or Globish) language that is widely used well beyond the borders of traditionally English speaking countries. Indeed, as Smithers and Gray note, because 'a lingua franca like Globish is distinctly different from English as a native language, Globish will need to be learnt by native speakers as well as non-native speakers' (2017, p. 47). Moving beyond simple matters of vocabulary, since the concept of Business English as Lingua Franca (BELF) already places the language at the heart of global business activities, students are required to 'learn – not only the key business terminology – but even more importantly, the related concepts, genres, and practices that are typically shared in the business discourse community and…[are] salient in a particular communicative situation…[enabling speakers] to use English as a tool to get the work done while simultaneously maintaining a good relationship with communication partners' (Kankaanranta, & Louhiala-Salminen, 2013, pp. 30-31).

When thinking about content as opposed to skills courses, the question of how the 4IR will affect what is to be taught and how it is to be conveyed to students is the subject of considerable concern and sharp debate. In terms of the curriculum, widely divergent views were openly on display at a recent conference of university presidents in South Korea. Opinion was divided on the question of whether tertiary education would have to become more technical. Yeon-Cheon Oh, University of Ulsan president, for example, argued that 'given the huge changes that will be brought by developments in artificial intelligence and automation, there was a need to provide software education to all students…However, Umran Inan, president of Turkey's Koç University…rejected the call for wholesale curriculum reform. "If we end up devising our curricula so [they're] now much more software based, then we will be doing a service to industry but not to higher learning and to the future of mankind, in my opinion," he said. Professor Inan warned that "when the next jobs are not predictable, even five years from now, the thing to do is not to accommodate but to step back and generalise"' (Morgan, 2017). The 4IR seems set to exacerbate the long-running skills versus content debate in terms of university curricula.

In terms of how institutional learning is to be structured in the 4IR, too, controversy reigns. Michael Peters, for example, argues that universities should embrace openness when confronting the question; 'What is the role of higher education in the digital age when technological unemployment becomes the rule rather than the exception?' (2017, p. 6). Although he couches the question in rather pessimistic terms, Peters does see opportunities for the tertiary sector, particularly in the form of the provision of Massive Online Open Courses. 'The MOOCs revolution promises to open up school-level and higher education by providing accessible, flexible, affordable courses, using a range of platforms. Fast-track completion of university courses for free or low cost has the potential to change course delivery, quality assurance and accreditation, credentialing, tuition fee structures and academic labour.

Educational institutions need to learn from these initiatives' new business, financial and revenue models to meet the needs of learners in an open marketplace. Open education brings opportunities for innovation and exploration of new learning models and practices' (Peters, 2017, pp. 4–5).

A brave new world, certainly, but what business model does it imply? How are the providers of 'free or low cost' courses to survive financially given current funding arrangements? For when we are all studying quantum entanglements with Professor Leonard Susskind at Stanford, as is already possible via Youtube, what is the role for departments of physics at institutions who do not employ those with his expertise and do not have the endowments that allow them to make such expertise available to the general public without cost? How does meeting 'the needs of learners in an open marketplace' not end in oligopoly and plutocracy as far as most universities are concerned? Such questions broke surface in 2013 when San Jose State University, on cost grounds, recently opted to use materials from an online course by Harvard professor Michael Sandel in its own teaching. San Jose philosophy faculty vehemently protested that this would 'compromise the quality of education, stifle diverse viewpoints and lead to the dismantling of public universities… Most faculty objections arise out of concerns about how online courses impinge on the professor–student relationship — and how they may lead to the privatization of public universities, and the loss of faculty jobs' (Lewin, 2013). Certainly technology will provide fresh opportunities for educators, and indeed they are already being exploited by newcomers like the Khan Academy, the Floating University and their imitators, but current developments seem quite as likely to demand new skills sets and ways of working for employees in many traditional universities as they will for those into traditional factories, if they are to survive. MOOCs and the manner of their reception are, in certain ways, the In4.0 in microcosm for universities.

Outside the groves of academe, a prediction from the 2016 WEF 'Future of Jobs Report' that has been very widely quoted is the net loss of 5 billion jobs worldwide by 2020 as a result of the 4IR that it believes is unfolding. Such projections are clearly dependent on the rate of adoption of new technologies, and other estimates of their negative impact have been considerably lower, and here one must be careful not to ignore the barriers that still remain to the diffusion of In4.0 practices. At whatever level job losses occur, though, one can be reasonably confident about the identity of at least some of the likely losers: those currently in low-skilled factory jobs who will no longer be required as a result of ongoing automation, and women, who are more likely than men to be found in the 'Office and administrative' jobs family. Within companies, IT departments may wither if the platformization resulting from the spread of cloud-based services proceeds apace for reasons of convenience and cost.

More problematically, there is the question of which countries will gain, and which will lose most from In4.0 changes, particularly those that eliminate low-skilled factory work. In part this will de decided by which of them are most successful in taking advantage of the employment creating opportunities offered by In4.0. Concerns have already been expressed about the ability of South American countries, for example, to compete in the new dispensation. 'For a region living with entrenched structural problems affecting everything from education to infrastruc-

ture and international competitiveness to public administration, the Fourth Industrial Revolution looks frightening. The Third Industrial Revolution (electronics, IT, automated production) has yet to reach several parts of Latin America, which itself is a sign of the massive challenges facing the region' (Andreoli, 2016). Similar sentiments have been expressed in respect of South Africa. 'The apprehension over human jobs being replaced with cobots, a robot intended to physically interact with humans in a shared workspace, is palpable. Skills instability is expected to impact all industries. There are fears that the poor and non-skilled would be plunged into even deeper deprivation with the rise of the digital era. The country has one of the most militant working classes in the world and the labour unions as members of the tripartite alliance, mitigate that South Africa needs to invest in human capital rather than technology' (Balkaran, n.d., p. 1).

Some have welcomed the utopian prospect of a jobless world awash in material products, and the concept of a universal basic income has gained some traction. How this enforced leisure would be used in practice is unknown though, and eliminating the discipline of work from human existence is a risky endeavor at best. The prospect is, though, some way off, and there are more immediate concerns about a world in which some, but by no means all, jobs are under threat. How will this affect the SME sector in particular?

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There are a number of reasons, our complete ignorance of the future aside, that explain why it is difficult to assess how, and how far, future technological developments will pose a threat to SMEs. They constitute, in the first place, a very diverse sector in terms of occupation as well as size. Furthermore, even if we restrict ourselves to the world of manufacturing and the term In4.0, we quickly find that it has no sharp-edged definition. In a 2015 study, Hermann, Pentek and Otto noted the following anecdote: '"Even though Industrie 4.0 is one of the most frequently discussed topics these days, I could not explain to my son what it really means", a production site manager with automotive manufacturer Audi puts it', and they go on to acknowledge that 'As the term itself is also unclear, companies are struggling when it comes to identifying and implementing Industrie 4.0 scenarios' (2015, p. 4). Having listed what they regard as its major components – Cyber-Physical Systems (CPS), the Internet of Things (IoT), the Internet of Services (IoS) and the Smart Factory – they feel able to proceed to offer their own definition. 'Industrie 4.0 is a collective term for technologies and concepts of value chain organization. Within the modular structured Smart Factories of Industrie 4.0, CPS monitor physical processes, create a virtual copy of the physical world and make decentralized decisions. Over the IoT, CPS communicate and cooperate with each other and humans in real time. Via the IoS, both internal and cross-organizational services are offered and utilized by participants of the value chain' (2016, p. 11).

Hermann, Pentek and Otto accept that there are limitations to their ability to predict the course that In4.0 will follow. This is in part simply a reflection of the essential unknowability of the future; as they note 'Even the key promoters of the idea, the "Industrie 4.0 Working Group" and the "Plattform Industrie 4.0", only describe the vision, the basic technologies the idea aims at, and selected scenarios', which is of limited help when, citing Drath, they agree that 'for the

first time an industrial revolution is predicted a-priori, not observed ex-post' (2016, p. 3). Almada-Lobo believes the shape of the future, while still foggy, can at least be discerned in outline, and that 'Manufacturers can begin now to define their target manufacturing model and then plan a transformation roadmap. Despite the significant hype around the topic, nobody knows what the exact consequences are for manufacturing operations or when will these happen, although there's a clear notion that the later-movers will most likely be forced out of the market' (2015, p. 17). Even here, though, we should add that all the factors considered above are 'known unknowns', as opposed to the 'unknown unknowns' that can distort the realization of even the clearest of visions.

Further complications appear when we move beyond the epicenter of In4.0 in Germany to try to take in the global picture. Here, since a pattern of winners and losers at national and regional level seems inevitable, there has been a rush among governments to replicate and improve upon the German model, as well as a plethora of private initiatives.

SUNY's Kemper Lewis (2017) has outlined the response at federal level in the U.S. 'In 2011, the president's Council of Advisors on Science and Technology sensed the U.S. risked economic, social and political security if it was not at the forefront and recommended the government create a series of public-private partnerships to support advanced manufacturing initiatives. Known today as "Manufacturing USA," these initiatives created a number of national institutes each with a particular emphasis including 3D printing, digital manufacturing and flexible electronics. By bringing together industry, academia and government, these partnerships began the process of training the workforce for new and emerging careers, facilitating the transfer of technology from the lab to the market, and increasing our nation's overall competitiveness.' Individual states and cities have also taken initiatives. In December 2014, John Cranley, as Mayor, proclaimed 'Cincinnati to be the Industry 4.0 Demonstration City', based largely on the presence of the Center for Intelligent Maintenance Systems at the University of Cincinnati. Nor have American companies been slow off the mark. As Drath and Horch (2014) note, within a year of the launch of In4.0 in Germany, 'similar ideas have been brought up under the name Industrial Internet by General Electric. The technical basis is very similar to Industrie 4.0, but the application is broader than industrial production and also includes, e.g., smart electrical grids.'

Yet amid all the enthusiasm excited by talk of In4.0, some dissenting voices can still be heard. Mikael Gidlund, a professor of Computer Engineering at Mid Sweden University and an expert on wireless communication, is one such. In a presentation entitled 'Myths, truth, and challenges in industrial 4.0 and wireless automation', given at the 2016 Johannesburg Summit on 'The Future of Wireless 2020 and Beyond', he made the general point that industrial automation is a very conservative sector which usually devotes considerable time to testing new initiatives before adopting them. He went on to argue that In4.0 is an evolutionary rather than a revolution process, and that some of it is a largely a matter of updated terminology; Cyber-Physical Systems, for example, can be viewed as simply another term for Distributed Systems, a concept which has been around since the 1990s. Much of the technology that In4.0 involves, such as digitalization, has in fact, Gidlund says, been around for a number of years and has already been

incorporated by industry; with Big Data too, he cites the example of Dow Chemicals, which has more than twice as many transactions per day per plant than Facebook. So rather than adopting wholly new technologies, In4.0 will in fact, according to Gidlund, essentially involve coming up with new business models, and also creating the skilled workforce, especially in computer science, necessary to run a smart factory. He also believes that there are very considerable technical challenges to be overcome in attempting to make the vision of In4.0 a reality. These include relatively simple problems, like those involving the standardization and longevity of batteries, the temperature control needed to ensure the functioning of the IoT in factories, and the ensuring of the security of wireless communication within a plant. Others relate to the increasing complexity of automated production systems, much of which has to be hidden from the end user (Gidlund, 2016). Even more widely, issues of safety and security are extremely important to customers looking to buy automated systems; incidents like that at the VW plant near Kassel in Germany in 2015, when a young factory technician was crushed to death by a robot, only tend to heighten concerns in this area.

Granted that In4.0 will come on stream more slowly than its proponents may wish, we still have to ask the question; in what areas are SMEs likely to have to adapt? Wahl has surveyed the work of other scholars to compile the following, rather formidable, list. 'Future threats and or opportunities are related to the output (personalized, local production and mass customization), process (networked manufacturing and cluster dynamics, end-to-end digital engineering, top floor-shop floor integration, real-time and value-added networks), business models (fragmentation of the value chain, integrated service offerings, creation and development of emotional products and services, modular architecture and customer co-creation), competition (converging frontiers), globalization (light footprint, low-cost and frugal innovation), skills (interdisciplinary thinking is key, higher degree of complexity)' (2015, p. 244).

Fears have been expressed, even in Germany, that the weight of this burden will prove too much for SMEs, and that the future will belong to much larger business entities that have the resources to cope with the demands of this new world. Lutz Sommer of Albstadt-Sigmaringen University in Germany poses the key questions on this topic; 'Will Industry 4.0 have an impact on Germany's business structure? Will there be winners or losers depending on companies' size? Will the already existing gap between large and small businesses increase and, accordingly, will it be a revolution of large enterprises at the expense of small enterprises?' (2015, p. 1513). Not all of the answers being provided are reassuring. Sommer cites the opinion of two German researchers in an article in *Manager Magazin* in February 2015 to the effect that "' The backbone of German economy, SMEs, is sagging. In the meantime US champions, the Microsofts, Amazons and Googles of this world, enter the business with all their cleverness and acquisitiveness. With regard to making business with the consumer 4.0 they are already uncatchable and far ahead"…Only large enterprises like Bosch, Siemens or SAP could be capable of taking up the challenge successfully whereas…this doesn't apply to SMEs: "SMEs know that something has to be done, but they don't know how and where to start" (Sommer, 2015, pp. 1515-1516).

Sommer himself is somewhat less pessimistic. After examining a set of surveys conducted

on the subject, he concludes that 'enterprises – depending on their size – feel more or less well-prepared for Industry 4.0. Large enterprises tend to feel better prepared than small enterprises. In other words, SMEs still show deficits compared to large enterprises. Implications for the practical implementation are amongst other things that enterprises are indeed willing to face digitization/Industry 4.0, but that risks/obstacles reduce their readiness or slow down the process. Furthermore, the enterprise size plays an important role' (2015, p. 1528).

How are Malaysia and Japan faring in this respect? More particularly, how actively and how successfully are their governments acting to address the potential problems?

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Any assessment of the policy responses in these two countries will need to take account of the general developments promoted by their governments as well as those that are specific to the SME sector.

IT infrastructure is one key general area where effective action certainly has been taken. According to the WEF's Global Information Technology Report 2016, both governments are having success in this sphere. With respect to its findings in terms of the Networked Readiness Index, it observed of Malaysia (which was in 31st place on the index globally) that its 'strong performance continues to be supported by a government that is fully committed to the digital agenda and that is seen to be ahead of its peers in terms of adopting the latest technologies. With approximately two-thirds of the population online, individual usage is growing further (47th, up 10 spots); in particular, the uptake of mobile broadband has taken off and reached almost 60 percent. An agile business sector (26th for business usage) is using ICTs to its advantage, interacting with consumers online and re-optimizing business models and organizational structures, thereby contributing to the overall strong performance' (WEF, 2016b, pp. 27–28).

Japan also fared well in this survey. Placing the country in 10th place on the list globally, the Report noted that 'The business and innovation environment is improving visibly with progress in the perceived availability of venture capital, the quality of management schools, and government procurement of advanced technologies; this is the continuation of a strong positive trend, moving the country from 40th place in 2014 to 33rd in 2016 in this particular pillar. Japan also keeps building out its infrastructure, in particular international Internet bandwidth and the number of secure servers' (WEF, 2016b, p. 25). In another, less granular report by Fujitsu, Japan was one of 15 countries surveyed, for which group the aggregate findings were that '89% of business leaders responded that their organizations are undertaking digital transformation initiatives. 34% of these initiatives had already delivered positive outcomes, contributing to business growth' (Fujitsu, 2017). No information specific to Japan could be gleaned from this report, and one suspects that the SME sector was not especially well represented among the 309 Japanese companies that provided responses to Fujitsu. According to the company website, though, Fujitsu itself certainly recognised the need for larger companies to work with the SME sector some time ago; its Local Network System, for example, 'was formed by small- and medium-sized transport carriers in 1991 to make distribution more efficient and improve service. Today, it has 1,650 members nationwide and is the largest such federation in Japan. It books requests for trucks and cargo, arranging return-trip cargo and efficient partial-load

dispatching for no-loss freight. It matches cargo information and available-space information, and can execute contracts and settle transactions in real time, all part of the ongoing effort to make freight transport more efficient...[and] has been implemented as a private cloud so that carriers can get up and running with it quickly and with no interruption to their operations' (Fujitsu, n.d.).

This kind of development is by no means uniform across the Japanese IT sector, though. A recent survey by Iwamoto and Hatano concluded that 'In Japan, it is rare to find complete IoT systems introduced in the production process of SMEs. The simple reason is that SME managers do not understand IoT' (2017). Similar concerns have been voiced with respect to Japan's businesses generally. As Yamaguchi notes with respect to the broad development of IoT, 'In the U.S. a group named the Industrial Internet Consortium (IIC) was organized in 2014 by such companies as GE, AT&T, IBM, Cisco Systems, Intel and others to set a standard on the IoT. In Germany the industrie 4.0 is being led by manufacturing industries while the IIC is promoted mainly by IT companies in the U.S. which have a high global share for their services. If the standardization and normalization of the IoT is to be promoted by the leadership of the U. S. companies, companies in Japan and Europe could lag behind the U.S. counterparts. Therefore, they will need to take part in the work of standardization and normalization from the early stage of its development (2016, p. 2).

A recent Microsoft Asia Digital Transformation Survey seemed to provide a similarly positive general picture in respect of Malaysia. Its finding led to media reports that 'Business leaders in Malaysia are showing urgency in embracing the 4th Industrial Revolution, where 80% of them believe that they need to transform to a digital business to enable future growth.' However, awareness and action are not the same thing, and so 'Even as majority of business leaders are aware of the urgent need to transform digitally to address the changing business climate, the study found that the transformation journey for most organisations in Malaysia is still at its infancy. While only 34% of business leaders have a full digital transformation strategy and less than half (47%) are in progress with specific digital transformation initiatives for selected parts of their business, 19% still have very limited or no strategy in place' (Digital New Asia, 2017). Once again, this survey is not broken down by business size, and it would not be a surprise if SMEs were overrepresented among the 19%, if indeed they had taken part in the survey at all.

That this is the case seems apparent from the evidence collected by Bahrin, Othman, Azli and Talib who conclude that 'Despite the long involvement of automation and robotic in manufacturing, the idea of Industry 4.0 in Malaysia is mostly influenced by foreign companies such as KUKA and ABB. Very large manufacturing companies and multinational groups already consider this topic as very important. Small and medium enterprises (SME) do not yet appear to consider industry 4.0 to be of great relevance to them, although these companies are most likely to be the big winners from the shift. SME companies are often able to implement the digital transformation more rapidly because they can develop and implement new IT structure from scratch more easily' (2016, p. 141). Yet some of this potential is not being exploited because companies do not always avail themselves of the help on offer. As Musa and Chinniah note in

their study of the development of 'green SMEs' in Malaysia, 'SMEs are often constrained by many problems such as the lack of skilled workers and technical know-how, little or no innovations through research and development (R & D), limited economic of scale, and difficulty in shaking off traditional methods of operation. Many SMEs place insufficient attention to upgrading the skill and knowledge of their workforce, or are reluctant to take advantage of training programmers' sponsored by the government' (2015, p. 259).

The tasks facing governments in preparing the SME sector for In4.0 in both Malaysia and Japan are therefore considerable. In Japan, managing change in this sector is the primary responsibility of SME Support, Japan, whose website describes its mission as follows; 'SME Support, JAPAN plays a central role in comprehensively implementing Japan's SME policies, operating within the competence of Ministry of Economy, Trade and Industry (METI) of Japan. We provide various support measures to promote growth for 3.8 million Japanese SMEs that account for 99.7% of total companies in the country. Our extensive and practical support is tailored to meet individual SME needs, implemented by collaborating with municipalities, government agencies, financial & research institutions, and other support organizations'. In Malaysia, the equivalent organisation, SMECorp Malaysia, notes on its website that it has an SME Masterplan under which there are 6 High Impact Programs whose objectives include offering assistance to SMEs in terms of market access, human capital development and financing; in the last of these areas, it aims, for example to establish investment companies to inject capital into potential SMEs in the form of debt, equity or a hybrid of both.

But it would be a mistake to think that the only problems that SMEs will face in the future are technological ones. There are some even more basic flaws like financial mismanagement that still need to be addressed. In the case of Malysia, Rahman, Yaacob and Radzi have drawn attention to the work of other scholars who have shown that 'Despite having various government assistance and programs targeting the new entry SMEs, the failure rate is getting higher…The main reason for SME closure is due to the fact that SME owners are not aware of the business challenges, especially in terms of financial and management skills…The funds provided by the government or any other sources are used without proper records and future plans' (2016, p. 124).

Going beyond that, there are issues that might more properly be called social and even ethical, some of which are becoming increasingly obvious in Japan. As Kamei and Dana noted some five years ago, 'As the Japanese population ages, an annual 70,000 small businesses cease operations because the director cannot find a successor' (2012, p. 61). While the government instituted reforms in 2008 to facilitate SME succession and reformed the taxation system to try to help with this problem, it appears that success here was not complete. Very significant human factors were left largely untouched according to Kamei and Dana, since 'in the transmission between father and his son, the human risks (the personality, the competence, the comparison with the founding father, the relation with the customers and the employees attached to him, etc.) are as important as the material and financial risks', meaning that 'The biggest concern on SME succession is how we can support to manage these human factors which are not still resolved even with the policies of Law Concerning Smooth Business

Succession at SMEs and of a drastic reform on inheritance tax' (2012, p. 69).

Here we enter the territory of human relationships, which are profoundly important to the functioning and longevity of SMEs. There are social and ethical problems that remain to be addressed, and they are just as important as the economic challenges that face the SME sector, not least because of the potential that SMEs have for making a unique social and ethical contribution to the nations in which they are located. It is not obvious that governments are best placed to deal with these issues, which opens up a realm of activity for others, including universities.

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Much has been written about the economic significance of SMEs as sources of innovation and entrepreneurship, in addition to their aggregate importance as employers and contributors to GDP. Rather less attention has been given to their social and ethical significance, but recently some interesting avenues for exploration have been opened up.

In terms of the ethical dimension of SMEs, research is accumulating on the extent and the ways that SME's have been adopting the principles and practices of Corporate Social Responsibility. As Morsing and Perrini argue, there is a 'temptation in a mediatized world to focus predominantly on a few large megabrands' CSR engagements…[but] it also matters a lot for the global economy to what extent small businesses decide to engage in CSR activities' (2009, p. 1). A recent literature review by Kechiche and Soparnot notes that, in terms of implementing CSR initiatives, 'SMEs have certain weak spots such as the lack of resources, time and knowledge particularly of matters pertaining to sustainable development' (2012, p. 101), and they conclude that while a certain amount of progress has been made in these areas, much remains to be done.

It can be argued, though, that the fundamental social and ethical problem posed by business activity today is not the success or failure of companies to implement CSR, which receives much media attention and about which there is a vast academic literature. Instead, the core problem is what has been called Corporate Irresponsibility (CI). It will not take anyone long to come up with a list of recent corporate scandals that have had disastrous consequences. In the U.S., for example, the Lehman Shock was in considerable measure the product of grossly irresponsible behaviour by large financial corporations who created and exploited the explosion in subprime lending that ended in disaster. The U.K. has had similar experiences with the Royal Bank of Scotland as well as the Libor scandal, to name just two. In Germany, there has been Volkswagen. In South Korea Samsung is currently in turmoil. Malaysia and Japan have not been immune either: the names of 1MDB, Olympus, Toshiba and Kobe Steel can be added to this roll call.

CI is far more insidious and damaging, not least because it appears to be systemic in nature and so cannot be eradicated by well-intentioned but essentially cosmetic policies like CSR. Paddy Ireland, who has devoted much of his career to explaining the origins of the modern corporation in the U.K., and by extension in the U.S., has made this point very forcefully when arguing that change of a far more radical nature than CSR is required if CI is to be tackled effectively.

> 'The growing problem of corporate irresponsibility has not, of course, gone unnoticed. Thus far, however, the response has been limited in nature and ambition. In addition to the considerable effort that has gone into dealing with executive and accounting malpractice—primarily, of course, to protect the *rentier* interest—recent decades have also seen the rise of the idea of corporate social responsibility (CSR). Unlike the earlier idea of the 'socially responsible corporation' with its transformative aspirations, however, contemporary CSR is a rather conservative notion, which seeks only to ameliorate…While the former entailed important changes to the way in which the corporation was conceptualised (and to the constitution of the corporate legal form), contemporary CSR, with its emphasis on voluntary self-regulation, leaves untouched the shareholder-oriented model of the corporation and the corporate legal form as presently constituted. It is hardly surprising that CSR has been so warmly embraced by so many corporations (2008, p. 853).

Ireland's contention is there is an institutional vacuum of responsibility at the heart of the corporate model, at least as it operates in the U.S., the U.K. and perhaps Europe. He argues that this was present at the very foundation of the modern corporation and therefore pays close attention to the crucial 19th legal decisions that created the modern corporate form in the U.K. and the U.S. Chief among these were those that rendered shareholders far less powerful than they are often taken to be. Rather than any longer being the owners of the assets of a corporation, they were now merely entitled to a share of its profits, and so effectively became simple *rentiers*. This development was made possible by the invention of the legal doctrine of corporate personhood, by which the corporation itself, a reified legal abstraction, became the owner of its assets, which were only managed by its executive officers. It is the corporation's capital, 'locked-in' in perpetuity beyond the reach of the shareholders, that is now decisive in determining the company's behavior. No human individual or individuals, neither shareholders nor managers, are therefore ultimately personally responsible for the behaviour of the corporation. As Ireland argues, 'With the externalisation of the shareholders, 'the company' [corporation] has come commonly to be seen as a depersonalised and reified entity, which, in a certain crucial sense, lacks an inherent nature or character…the autonomous company – the company 'completely separated' from its shareholders – is but the personification of *industrial capital* and an entity which is subject to its relentless logic' (1996, p. 69).

Ireland has thus arrived at the position reached earlier by John Kay, who found himself forced to 'to reformulate the nature of the [corporate] governance problem in terms of ownership *per se*' (1999, p. 52). Kay himself has sharpened his arguments on the subject in light of more recent events. He described the failings of the corporate culture of financial institutions in the years leading up to the Lehman Shock in the following terms: 'Commitments to the interests of clients, loyalty to institutions, were replaced by the aggressive pursuit of self-interest and the culture of "I'll be gone, you'll be gone"' (2015, ch. 4). The fact that corporate employees could act irresponsibly because they knew that they would have left their employer before the problems they had contributed to came to light is another manifestation of the

systemic nature of CI. The twin concepts of ownership and personal responsibility are utterly absent in such a conception of the role a corporate employee, or indeed a shareholder. We are not dealing here with a failure of corporate ethics, but with the institutional absence of a corporate ethical sense. As John Kay put it, 'The ethical standards associated with part of the finance sector have been deplorable. Read the e-mail exchanges among those responsible for fraudulent interest rate submissions…What were these people thinking?' (2015, ch. 9). Just as importantly, however, how could such a culture flourish except in a completely depersonalised world? It is in connection with this absence of a fundamentally ethical and human dimension that we begin to see the importance of SMEs not just to the economy, but also to the society of which they are part. They may not find it so easy to implement CSR, or have much interest in trying to do so. As Spence, Schmidpeter and Habisch have pointed out, 'MSEs facing competitive pressure and limited cash flow may not be motivated to spend time and money on ethics if, adopting the economic model, they perceive it as a business cost with no benefit' (2003, p. 18). At the same time, though, SMEs do at least have a much better chance of avoiding CI and the fundamental amorality that it enables. This is not, of course, to argue that all SMEs are paragons of virtues – far from it. But their nature does give them opportunities to behave ethically that are denied to large corporations.

That this is should be so is partly a matter of size. E.F. Schumacher, following Leopold Kohr, famously proclaimed that 'Small is Beautiful'. It would be too much to claim that 'Small is Ethical', but it could be asserted that 'Small and Medium Make the Ethical More Possible'. Size is important in such matters, partly because it can act to reduce the temptation that accompanies greed – SMEs are more likely to be focused on more modest ambitions, not least survival – and there is much less power to be abused.

A second factor is the retention of a human scale. Vaclav Havel, the first President of the newly independent Czechoslovakia after the fall of Communism, drew attention to the problems that plague corporations simply because of their monstrous size.

> '…it is well known…that enormous private multinational corporations are curiously like socialist states: with industrialization, centralization, specialization, monopolization, and finally with automation and computerization, the elements of depersonalization and the loss of meaning in work become more and more profound everywhere…IBM certainly works better than the Ŝkoda plant, but that doesn't alter the fact that both companies have long since lost their human dimension and have turned man into a little cog in their machinery, utterly separated from what, and for whom, that machinery is working, and what the impact of its product is on the world…Such "megamachinery" is not constructed to the measure of man, and the fact that IBM is capitalist, profit-oriented, and efficient, while Ŝkoda is socialist, money-losing, and inefficient, seems secondary to me.' (Havel, 1991, p. 10)

A further consideration is the question of ownership. SMEs tend not to share the depersonalised nature and structure of large corporations, which means that their ownership is real,

identifiable, human and involved in the day-to-day activities of the business. As Demuijnck and Ngnodjom note in the African context, 'a striking characteristic of SMEs in comparison with large firms is that management is personalized in SMEs. SMEs generally lack formal management structures with specialized staff' (2013, p. 654). As a result, the key figure is often the 'owner-manager', and this opens up certain ethical possibilities. Lepoutre and Heene cite research that suggests, for example, that 'small business owner-managers are particularly sensitive to activities related to their immediate internal stakeholders (employees, customers and suppliers), involving loyalty in their (often close) relationship with customers and employees; openness, honesty and fairness in contracts, agreements, payments and (marketing) information; pricing issues among competitors; and the origin of resources…On the other hand, such unethical actions as padding expense accounts, often resulting in a higher income for the owner-manager, are experienced as less problematic (2006, p. 259).

Again, one needs to be careful not to paint too flattering a portrait of SMEs in this regard. The argument that SMEs are likely to act ethically because they are embedded in local communities can be taken too far. As Moore and Spence note, 'While those who draw their customers from a close geographical group (e.g. garages) are perhaps more likely to feel that moral proximity acutely, others may be relatively unattached to their surroundings (e.g. web designers) and readily enjoy the independence which is a common motivation for starting one's own small business (2006, p. 222). But they also cite work that shows 'that there was not a general orientation towards maximisation of profit in small organisations. Similarly, it has been found that competitors are often treated as (moral) stakeholders rather than just adversaries in the marketplace' (2006, p. 221).

That this is so owes much to the fact that 'what constitute personal and business ethics are probably closer in situations were the owner is also the manager in a business' (Vyarkanam et al., 1997, p. 1626). This bridge between the two worlds is a vital one, because it allows us to move beyond the concept of business ethics to that of 'business as ethics', which is far more likely to flourish in the SME sector. That this is so can be seen, in the case of Japan, in the thought and deeds of Chikuro Hiroike, the creator of the science of Moralogy.

It would not be too much to say that, in economic terms, Hiroike and Moralogy emerged from an SME culture. Hiroike himself was born in Kyushu, in the far West of Japan, where his father owned a small farm of less than 8 acres and supplemented his income from other jobs such as the raising of silkworms. As a young boy Hiroike helped his father on the farm and, though himself destined for a career of teaching and scholarship, still found time to write a book suggesting how to improve silkworm cultivation. He never lost touch with the world of small producers and ordinary working people, and among those who came to the Institute of Moralogy that he founded were many who either owned or were creating small businesses. He was concerned to offer them advice about how this should be done. 'In setting up our business…we should start with character building. For example, in purchasing materials or goods, we should be mindful to procure sound and comparatively inexpensive articles from morally trustworthy people. If once we are connected with moral suppliers, it is easy to make a good sale…It is better…rather than to employ many, to employ persons of better

character…This, however, is not the practice nowadays' (Hiroike, 2002, III, 76–77).

Such advice reveals a central tenet of Moralogy; that moral concern should permeate all human activity, including work. For this reason, there really can be no separate 'business ethics'; rather one should think of business activity in broader and more connected terms. In the first place, the emphasis that Hiroike placed on the responsibility that unavoidably devolves on each and every individual to think and act morally at all times and in all circumstances remains of central importance in dealing with some of the most common moral dilemmas that confront people at work. In a second way, too, Hiroike's view of the world of work was much more radical in nature than can sit comfortably within the sphere of 'business ethics'. He saw the workplace as a setting in which individuals, all individuals at every level of a business organization, should not passively await intermittent demands on them for ethical decisions, but actively and constantly search out opportunities for moral action.

This placed a particularly heavy responsibility on business owners, most of whom were likely to have been in charge of SMEs at that time. As Hiroike told one of his disciples, 'A factory that only manufactures goods is not interesting. A factory must be a place in which people develop themselves. There are many factories in the world that manufacture goods, but the mission of the business owner is to develop the people involved in the business. As a consequence, Hiroike warned business owners against focusing primarily on economic outcomes. 'You are putting your business before human salvation because you think your business is more important than bringing salvation to humankind. If so, you are working for human salvation to expand your business, not conducting business to bring salvation to people. Thus, you are putting business before people' (Institute of Moralogy, 2005, p. 496).

The SME world is a very suitable context for exploring the commonalities between such principles and those of Islam. Of particular interest here is the work that has been done by Selçuk Uygur, of Brunel University in London, and others on the situation in Turkey, where 'It is observable that the number of private businesses, particularly SMEs (Small and Medium-sized Enterprises) increased substantially after the 1980s and the country has witnessed the emergence of a new type business people who are identified by their religious commitment' (Uygur and Spence, 2010, p. 1). Since 'Islam is a religion which prescribes an extensive set of principles and regulations shaping all the aspects of life, including business ethics' (Uygur and Spence, 2010, pp. 4–5), it might be helpful to compare Chikuro Hiroike's thinking with what have been identified as 'five basic Islamic Principles of morality: *Tevhid* (unity), *muvazene* (equilibrium), *ozgur irade* (free will), *sorumluluk* (responsibility) and *ihsan* (bounty)' that some have suggested should be important in the Islamic business world (Uygur and Spence, 2010, p. 5). Another alternative would a virtue based approach such as that recently taken by Karakas, Sarigollu and Uygur when investigating the role of 'integrity, affection, diligence, inspiration, wisdom, trust, gratefulness, justice, and harmony' (2017, 732), a number of which are central to Chikuro Hiroike's thinking. A further possibility involves attending to the purported 'Islamic Work Ethic', some work on which has been done on this as it relates to Malaysia, for example, by Mohamed, Karim and Hussein (2001) in connection with job satisfaction and other issues. But we should also note Uygur's finding that 'the pious business people in Turkey refer to quasi-Puritan

values, such as hard work, thriftiness, honesty and fairness, and call these values the "Islamic ethic". However it is clear that none of these values are exclusively Islamic' (2009, p. 217).

Most interesting, therefore, is the evidence gathered by Uygur and others on the concept of 'moral energy'. Uygur first advanced this concept when discussing how "…the new form of Islam in Turkey has facilitated the emergence of this new business class, providing them with a sort of moral and entrepreneurial energy' (2009, p. 223), and he and Spence then studied it as 'a way by which religious entrepreneurs interpret their faith in their business life' (2010, p. 2). They provide the following very suggestive account of the source of such energy.

> 'For the pious group, working is not limited to business activities at all…They spend a considerable amount of time for the discretionary activities and they consider it as part of work as well. The following is how one pious businessman describes the work after they close the factory at 6:30 p.m.: "… Then, the evening part comes. With my friends, we think about what we can do for humanity, who can do what…etc. We plan all these. … [The reason why I do this is to do with] the feeling of responsibility. If one feels responsible, especially while complaining about something for not being right, one develops the urge to find a solution. Here, we need to see what favour or goodness can be done for humanity; and we need to take initiative. … We all, with my friends, work devotedly towards raising and educating youths in a good atmosphere; and also towards what we can do for supporting this educational activities within the country and abroad…" These sorts of evening meetings are very common rituals among the pious group. They call it with different terms, such as "*akşam oturması* (evening sitting)" or "*çay* (drinking tea)" or *istisare* (consulting meeting). In a sense, these meetings are providing some sort of moral energy to the pious people' (2010, pp. 12–13).

One important figure in the strand of Islamic thought that underpins this 'moral energy' is Bediuzzaman Said Nursi, whose thought, as expressed in his *Risale-i-Nur,* has already been compared to that of Confucius by Jemil Hee-Son Lee, who finds many similarities between them, writing that 'Surprisingly, this basic Confucian philosophy and, in particular, the matter of ethics and morality can be found in the *Risale-i-Nur* to a great extent' (Lee, 2005, p. 107). Given that Chikuro Hiroike's thinking also derives in large measure from Confucius, and that Said Nursi's thought is influential in Malaysia, particularly through the work of his disciple, Fethullah Gulen, a more detailed comparative study of concepts like 'benevolence' in the SME world in both Malaysia and Japan might be of considerable interest.

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