

Organisational practices and grand challenges: The case of large digital firms

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1. Introduction

Following the thermo-industrial revolution, the impact of *homo sapiens* has been so deep that in thousands of years from now it will be possible to carry out a “geology of mankind” (Crutzen 2002). Indeed, besides traces of some past constructions it will be possible to identify geological evidence of its negative impacts on the natural environment (pollutions, destruction of biodiversity, global ecosystem changes). Our species appeared some 300 000 years ago, for Pálsson et al. (2013) if we are to survive the Anthropocene, “it is essential to fundamentally rethink the environment-humanity relationship”, and possibly to set boundaries to those negative impacts. For example, Steffen et al. (2015) suggested nine planetary boundaries, and not crossing them would require adequate governance responses (Biermann 2012). Unfortunately, according to Whiteman et al. (2013), “Despite awareness of the declining state of ecosystems, business management scholars have yet to adequately link business processes to macro ecological processes and boundary conditions”.

In order to examine the extent to which the business processes of large digital firms are linked to “macro ecological processes and boundary conditions”, that we call “grand ecological challenges”, we discuss the following propositions:

- **Proposition n°1:** Large digital firms are concerned with grand ecological challenges.
- **Proposition n°2:** Large digital firms adopted practices to address grand ecological challenges.

In Section 2 we present the background literature, and in Section 3 our data and methodology, before presenting our results in Section 4 and concluding with a discussion in Section 5.

2. Background literature

2.1. Grand challenges

In a recent paper, George et al. (2016) defined “grand challenges” (GCs) as “specific critical barrier(s) that, if removed, would help solve an important societal problem with a high likelihood of global impact through widespread implementation” (p. 2016). GCs are deemed complex, uncertain, and evaluative (Ferraro et al. 2015), and therefore concern all actors including management scientists. George et al. (2016) suggest several research avenues for the latter to contribute to a better understanding of how organisations can address GCs, including one titled “Outcomes and Impact” that this paper pursues. But conflicting logics and heterogeneous problem framings, among others, make it difficult for societal actors to address GCs. For example, Howard-Grenville et al. (2014) highlight in the case of climate change the “mismatch between the timescales of business and that of the climate”, while Ferraro et al. (2015) stress that solutions are difficult to develop and implement because GCs are “value-laden issues”.

Despite these difficulties, societal actors have started addressing some GCs such as climate change. In the case of firms, this can be explained by the fact that this GC will affect their business by reshaping value chains and altering how people live and work, requiring “new approaches to decision-making, forecasting/planning, and organisational adaptation” (Howard-Grenville et al. 2014). But the magnitude of the challenge is such that Wright and Nyberg (2017) deem it impossible to meet without governmental intervention. In their research on the translation into action of firms’ climate change commitments, they showed a dilution over time of their ambitions. Indeed, “corporate actions often regress to a business-as-usual approach” (ibid., p. 1657), which leads the authors to conclude that “business leadership on climate change alone is insufficient”. However, their research was based on large Australian firms in non-high-tech sectors, while our study focuses on international large digital firms, which may have different ecological practices.

2.2. Ecological organizational practices

How do firms do what they do? According to Kostova (1999), they use “organisational practices” (OPs), which can be defined as “particular ways of conducting organizational functions that have evolved over time under the influence of an organization’s history, people, interests, and actions and that have become institutionalized in the organization” (p. 309). Some

practices, which can be “taken for granted”, are called organisational routines (Nelson and Winter 1982). However, despite a rich academic literature (Feldman et al. 2016), this concept has seldom been used to investigate the environmental behaviour of companies (Gossart 2005, Gossart 2008), including in the case of digital firms praised to foster a smart and green “third industrial revolution” (Jänicke and Jacob 2009). We provide evidence in this paper that digital firms have developed a variety of practices to address grand ecological challenges, notably by using SDGs as strategic goals.

3. Data and methodology

The digital sector is composed of more than 130 000 firms, most of which providing services.

Table 1. Number of companies in the ICT sector ¹

Industry	1 650
Components	806
Communication equipment	366
Computers and peripherals	283
Electronics goods	184
Magnetic & optical devices	11
Large ICT trade	6 582
Services	123 603
Programming, consulting, ...	87 695
Repair	14 116
Data management	9 831
Telecommunications	5 382
Software	6 579
TOTAL	131 835

Service activities concentrate 94% of firms, 85% of staff, 88% of the value added. But the distinction between sub-sectors is not clear anymore, since for example HP and Xerox started selling software, and Microsoft, Amazon and HCL started making smartphones. There is therefore an increasing integration of the products and services in the sector, and this context of instability makes it more difficult to find solutions to ecological challenges, including to the own challenges of the sector which are far from negligible (Wäger et al. 2015). However, when

¹ The OCDE defines the ICT sector as the sum of all these sub-sectors (DGE 2016).

designing those solutions, the main actors of the sector all refer to SDGs, which can help companies contribute to sustainable development (Chakravorti 2017).

Since we are interested in the ecological responses of companies, we will focus on the four SDGs that relate directly to the biosphere, which according to Stockholm Resilience Centre (2016) form the basis of a hierarchical presentation of those objectives.

Figure 1. A hierarchical presentation of SDGs



This representation indicate that economic objectives need to be compatible with social objectives, which in turn need to fit within the limits set by ecological objectives (SDGs 6, 13, 14, and 15).

Our sample comprises 16 of the largest digital firms in the world, whose CSR strategy used the SDG and the GRI (Global Reporting Initiative) frameworks: Accenture, BT, Canon, Cisco, Deutsche Telekom, Ericsson, Hewlett Packard Enterprise (HPE), HP Inc., Intel, Microsoft, Nokia, Orange, Samsung, SAP, Telefónica, and Verizon.

In a previous working paper (Gossart 2017) we extracted the practices of these firms for each of the four aforementioned SDGs, based on the 2016 CSR reports of the sample firms. We could not base our analysis on solutions used to address planetary boundaries since the latter almost never appear in CSR reports. In this paper, we single out the practices used by these firms and present them in the next section.

4. Results

In each of the following subsections we discuss the propositions presented in the introduction.

4.1. Are large digital firms concerned with grand ecological challenges?

Digital firms, especially large ones, have many reasons to be concerned about ecological impacts, starting with their own impacts across each phase of the life cycle of their products and services (Hilty 2002, Hilty et al. 2006, Hilty 2008, ÉcoInfo 2012, Hilty and Aebischer 2015). They are also concerned with the ecological impacts of other sectors, since they offer solutions to mitigate them (Gossart and Garello 2015).

Large digital firms thus seem to be concerned with GCs since they all address at least some of them in their CSR reports, and since some of them are (founding) members of important institutions such as the Global e-Sustainability Initiative (GeSI), or the World Business Council for Sustainable Development (WBCSD).

4.2. Did large digital firms adopt practices to address grand ecological challenges?

By analysing the CSR reports of the world's largest digital firms, we could collect many different activities aiming to address ecological problems, including some GCs in the form of the four biosphere-related SDGs. For each of these SDGs we highlight the **practices** used to address it (➤), and for each practice we list the **tools** implemented to serve the practice (○) and **examples** of such tools (▪). We could identify six categories of practices: Impact assessment, Goal commitment, Monitoring, Resource saving, Product design, and Emissions reduction.

4.2.1. Practices used to address SDG n°6 (Clean Water and Sanitation)

Firms in our sample used four different practices to address this SDG, and a variety of tools.

➤ Assessing impacts:

- Check the availability of water resources when opening a new facility:
 - AQUEDUCT map (World Resources Institute)
 - Global Water Tool (Global Social Compliance Programme, World Business Council for Sustainable Development) to identify areas under water stress

- Committing:
 - Use labels
 - Sign charters (e.g. Global Compact CEO Water Mandate)
- Monitoring:
 - The content of waste water
 - Their own water consumption at home and abroad:
 - Water consumption
 - The water consumption of their suppliers & partners
 - Sensors to measure the quality of drinking water in real time
 - Toxic releases
- Resource saving:
 - Use independent consultants to certify water consumption
 - Implement circular economy practices (reuse, recycle, ...)
 - Adopt a product service system business model
 - Develop projects with and for local stakeholders
 - Smart buildings
 - Upgrade water infrastructures
 - Set quantified objectives

4.2.2. Practices used to address SDG n°13 (Climate Action)

Firms in our sample used six different practices to address this SDG, and a variety of tools.

- Committing:
 - Quantified commitments of GHG emissions reductions:
 - Reduce carbon intensity by 10% per dollar of sales (in 2020 compared to 2010)
 - Net reduction of 70% of GHG emissions during products' manufacturing phase (in 2020 compared to 2008)
 - Reduce by 2,5 Mt GHG emissions during products' use phase
 - Support climate education
 - By 2018, 150 suppliers must have set targets to reduce their GHG emissions (=> launch 90 collaborative projects)

- In 2020, objective 3:1, i.e. GHG emissions reductions of consumers should represent 3 times the quantity of emissions of the company (this enables fighting rebound effects, which are potentially very important in the ICT sector, see Gossart (2015))
- Reduce GHG emissions up the value chain:
 - By 2020 three quarters of suppliers must reveal their objectives and actions to reduce their GHG emissions
- Integrate climate issue at the heart of the business model
- Join industry-wide initiatives (e.g. GeSI)
- Sign Climate declaration (BICEP coalition)
- Join Digital Energy & Sustainability solutions Campaign
- Designing:
 - Eco-design products to reduce the consumption of energy and other inputs during the use phase
- Emissions reduction:
 - Carbon neutral company
 - Reduce CO₂ emissions from resource extraction & manufacturing
 - Reduce global GHG emissions to the level of 2000
 - Reduce global GHG emissions by 30% (in 2020) and by 50% (in 2030)
 - Reduce by 75% GHG emissions generated by the energy consumption of sold products (compared to 2014)
 - Reduce GHG emissions by 41% (compared to 2014)
 - Reduce GHG emissions by 25% between 2010 & 2020 as well as the carbon intensity of products
 - Create a Global climate change office at the group level
 - Reduce GHG emissions by 30% in 2020 and by 50% in 2030
 - Reduce emissions of suppliers:
 - Publish a manual of carbon accountancy
 - 74% suppliers have to reveal their energy consumption & GHG emissions
- Energy supply:
 - 50% renewables in 2020 and by 100% in 2030
 - 20% of electricity mix from renewables

- 100% renewable electricity by 2020
 - 100% renewable electricity and 40% by 2020
 - Increase the use of renewables
- Monitoring:
- GHG emissions across the entire lifecycle of products
 - Global GHG emissions, including the ones of the supply chain:
 - -10% by 2025 for those of first level suppliers and those related to product transportation (compared to 2015)
 - Use third parties to certify emissions and monitor progress (NGO CDP)
 - Join the *Smart Freight Centre-led Global Logistics Emissions Council* (GLEC) to help standardising the calculation of the global emissions of the commodity transportation sector
 - Obtain the level 3 of the label “Carbon Trust Supply Chain”
 - Obtain in Japan the certification carbon footprint (CFP, from Carbonfund.org) so that clients can earn carbon allowances by buying carbon-neutral products
 - Create an in-house carbon tax² to generate revenues that will finance green investments
- Resource saving:
- Energy saving measures during the use phase of products
 - Reduce energy consumption by 1,8% (in 2017 compared to 2016)
 - Reduce the energy intensity of activities by 50% per byte of traffic
 - Join the RE100 initiative (Climate Group + CDP) to reach 100% renewables energy supplies
 - Climb up the ladder of CDP’s “Climate A list”
 - Join WWF’s initiative “Climate Savers”
 - Use third parties to certify paper sources (84% FSC)
 - Use LED for lighting
 - Switch to electronic invoices
 - Carry out energy audits
 - Carry out energy saving projects

² More than 1200 companies are using it, 10% from the digital sector. See <http://www.rff.org/events/event/2017-04/companies-and-internal-carbon-pricing-hedging-risk-united-states-and-europe>.

4.2.3. Practices used to address SDG n°14 (Life Below Water)

Our sample firms seldom mention this SDG, despite the fact that it is connected to two of the nine planetary boundaries (Ocean acidification, Loss of biosphere integrity). Also, digital technologies use many metals that need to be mined, which has large impacts on life below water (ÉcoInfo 2012). When it is mentioned life below water is only addressed by projects aiming to protect local ecosystems. Only ethical issues are taking into account regarding mining, for example when addressing the issue of conflict minerals such as coltan. The main actions of digital firms for this SDG takes the form of *IT for green* solutions, such as the iBOL project (*International Barcode of Life*) supported by SAP.³ By using the *Lifescanner* app, anyone can monitor species and contribute to their protection (Wong 2014). Therefore, only a monitoring practice is used for this SDG.

4.2.4. Practices used to address SDG n°15 (Life on Land)

Firms in our sample used four different practices to address this SDG, and a variety of tools.

➤ Committing:

- 75% suppliers must respect CSR standards by 2020
- Reduce to zero the amount of hazardous waste sent to landfill
- Elaborate an ad hoc strategy to protect biodiversity
- Force suppliers to get their raw materials from responsibly managed forests
- Aim at zero deforestation for the paper sold and used by the company by 2020
- Use certified paper (FSC or PEFC)
- 100% packaging are recyclable
- Report progress every year to WWF's Global Forest & Trade Network
- Join CDP's forest programme
- Adopt a conflict minerals declaration
- Join the Private Alliance for Responsible Minerals Trade (PPA) & GeSI

➤ Monitoring:

- Use a third party (EcoVadis) to evaluate the ecological performances of its suppliers

³ See <https://www.sap.com/documents/2015/04/8ae32e13-247c-0010-82c7-eda71af511fa.html>.

- Measure metal flows across all the lifecycle of its products
- Participate to the Barcode of Life project (biodiversity on land)
- Resource saving:
 - Publish guides to protect biodiversity
 - For B2B, offer a collection programme for all consumers in 180 countries
 - Reuse and repair old equipment
 - Implement the IPR principle (individual producer responsibility)
 - Support local communities so that they protect their ecosystems

5. Discussion & conclusions

We wanted to discuss in this article whether large digital firms were concerned with grand ecological challenges and had adopted practices to do so. Our findings suggest that their practices show a concern for GCs in the form of SDGs 6, 13, 14, and 15, but that not all large digital firms carry out actions in these four SDGs. This heterogeneity will need to be explained in a later version of the paper. For example, the number of practices used to address each SDG differs across firms, since six types of practices are used to address SDG n°6, 4 types of practices for SDG n°6, 3 for SDG n°15, and hardly one for SDG n°14. This reflects the priority set by digital firms regarding biosphere-related SDGs: they are mostly concerned with the climate planetary boundary. This priority might be due to the fact that climate actions, in addition to they being topical, can enable firms to reap the low hanging benefits of win-win actions, instead of addressing other more urgent planetary boundaries such as biogeochemical flows. This tends to support the argument of Whiteman et al. (2013), according to which firms' environmental priorities are disconnected from planetary boundaries. The number of tools developed to support a given practice also varies across firms, but so does their decoupling potential. Indeed, some tools are more demanding but more effective than others: implementing an in-house carbon tax require much more efforts and will have much larger positive environmental impacts than the mere signature of a charter or declaration.

Regarding practices, we identified six of them used to address GCs, but their robustness cannot be assessed by studying CSR reports. A discussion will be included in a later version of the paper regarding how to conclude whether these practices are routinized or not. This is important to investigate since routines ensure the stability and resilience of firms and enable them to repeat

successful actions while minimising resources to do so. Routinized environmental practices would thus reveal the depth of organisational changes in firms committed to solve grand ecological challenges.

Another question worth investigating concerns the differences between routines used to address GCs and the ones used to address less complex ecological problems. Can companies use the same routines for any problems regardless of its complexity? If they do so, can it explain why they have difficulty making a strong contribution to GCs? Indeed, solving wicked problems may require specific solutions. For example, Wright and Nyberg (2017) explain how firms translate climate change concerns in their practices, before diluting their commitments. Examining the practices put in place (Table 2, p. 1645), one notices that they are similar to the ones that any firms could put in place to address a classic ecological problem (acquire technologies, advocacy campaign, employee training, joining roundtables, ...). Firms' inability to trigger substantial changes for GCs might be explained by the inadequacy of the practices used to address them. For example, Wright and Nyberg (2017) argue that "corporations are particularly ill-suited to address climate change, since their short-term objectives and reliance on growth and political interventions inflate the superwickedness of the issue" (p. 1635). Whereas for Williams et al. (2019), a major obstacle facing digital firms trying to address grand ecological challenges is "the resilience of the broader social-ecological systems in which the firm is embedded". Firms' current ecological practices may not be adapted to the characteristics of GCs. Opening the black box of their practices and routines could help understand the ones better fitted to address GCs.

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