

Munich Highlight Towers, IBM Watson Research Center, Mies-van-der-Rohe-Straße 6, 80807 Munich, Germany, and hybrid mode:

- CONASENSE Symposium: Yorktown South (21_{st} floor)
- Hackathon: Large Boardroom (20th floor)

Green Business Models and Use Cases for 6G

Prof. Peter Lindgren CGC Aarhus University, Denmark







Green Business Model Innovation research related to Nordic Start Ups and SME's

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Start Up and Small and medium-sized enterprises (SMEs) represent 99% of all businesses in the EU.

The term "green" as used in most business model frameworks up to recently have focused much on the **environmental dimension (Brundtland 1983) of TO BE BM's and less on reconfiguring of AS IS BM and very little** on the business perspective (turnover – cost = earnings) - efficiency.







Fig. 3.2 Possible relations between voluntary corporate environmental performance and economic success (similar to Schaltegger & Synnestvedt 2002, 341; Schaltegger & Burritt 2005, 197; Schaltegger & Wagner 2006a, 11)

Startup's and SME's in Nordic Countries

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A Startup is according to EU standards an independent, business, which is younger than five years and is aimed at creating, improving and expanding a scalable, innovative, technology-enabled business models with high and rapid growth.

Our definition of a SME is also built on the basis of EU Definitions

Small and medium-sized enterprises (SMEs) are defined in the EU recommendation 2003/361

What is an SME?				
Small and medium-sized enterprises (SM $\left\{ \mathbb{EN} \mid \mathbb{e} \in \mathbb{R} \right\}$.	Es) are defined in the <u>EU recomme</u> r	ndation 2003/361		
The main factors determining whether an enterprise is an SME are				
1. staff headcount				
2. either turnover or balance sheet tota	I			
Company category	Staff headcount	Turnover	or	Balance sheet total
Medium-sized	< 250	≤€ 50 m		≤€43 m
Small	< 50	≤€ 10 m		≤€ 10 m
Micro	< 10	≤€2 m		≤€2 m

The definition of a Green Startup and SME is important for access to finance and EU support programmes targeted specifically Green Businesses and related Greenbusiness model – EU Taxonomy – Green Deal.





1/19/2021

Startup's and SME's in Nordic Countries



eurostat 🖸

Startup's and SME's in Nordic Countries - About 1.2 mio. Startup and SME's

consumptions.	Tana	Enterpris	565	Turnover	() m (c)	Persons em	pioyed
country	rype	total	- 14	total	-	total	- 16
Bulgaria	independent	311 533	95.7	52 006	61.3	1 189 988	83.
	Dependent	14 017	4.3	32792	38.7	239 453	16.
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	In group of 250 or more persons	2 0 9 3	0.6	11053	13.0	65 149	-4.)
	An Anternational and un	4 9 9 9	4.4	13.424	15.8	79.112	A. 1
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Estonia	Independent	59 069	86.9	16 676	42.2	200 893	62.7
	Dependent	8 889	13.1	22 870	57.8	119 601	37.
	In aroup of <250 persons	5 362	7.9	5 976	15.1	43 182	13.4
	In group of 250 or more persona	127	0.2	974	2.5	4 4 6 4	
	In International group	3 400	5.0	15 9 19	40.3	71955	22 1
Croatia	Independent	140 337	96.0	28 531	60.3	552 148	80.3
	Dependent	5919	4.0	18 765	39.7	135 385	19.7
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	In group of 250 or more persons	1 560	1.1	10 687	22.6	65 064	9.5
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tally	Independent	3 479 094	94.5	1 011 925	50.9	8 928 585	79.4
	Dependent	200 871	5.5	975 455	49.1	2 289 209	20.4
	In group of <250 persons	160 685	4.4	364 443	18.3	1 237 643	11.0
	In group of 250 or more persons	13 169	0.4	338 442	17.0	470 572	4.3
	In International group	27 017	D.7	272 571	13.7	580 994	5.3
Latvia	Independent	97 888	89.5	17 173	43.0	370 031	73.7
	Dependent	11 540	10.5	22732	57.0	132 360	26.3
	In group of <250 persons	3 5 9 2	3.3	4 4 2 8	11.1	42 272	8.4
	In group of 250 or more persons	611	0.6	4049	10.1	21 111	4.3
	In International group	7 338	6.7	14 255	35.7	68 977	13.7
Netherlands	independent	1 067 822	97.9	460 000	51.4	2 836 893	76.4
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	In group of 250 or more persons	757	0.5	27 435	3.1	163 123	4.4
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Portugal	Independent	785 202	97.4		53.9		83.5
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	In International group	10 3 46	1.3	-	35.9		10.4
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	Dependent	34 632	7.6	64 815	42.0	538 797	21.1
	in group of <250 persons	6 965	1.5	9 103	5.9	125 128	-4.1
	In group of 250 or more persons	944	0.2	2 926	1.9	47 914	1.5
	In International group	26722	5.9	52 786	34.2	365 755	1-4.3
Finland	Independent	214 033	93.6	93 279	44.1	672 362	69.1
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	in group of 250 or more persons	2 937	1.3	48 875	23.1	106 964	11.
	In International group	3 503	1.6	40 429	19.1	80 880	8.3
Sweden	Independent	575 856	84.0	1	28.5	1	45.
	Dependent	109 470	16.0	:	71.5	:	54.4
	In group of <250 persons	82 090	12.0	- E - S	26.6		28.
	In group of 250 or more persons	9766	1.4	-	24.0	=	13.3
	In international group	17 614	2.6	:	21.0		13.
Norway	Independent	226 074	77.2	- F	26.3	482 855	44.
	Dependent	66 709	22.8	F	73.7	613 068	55.1
	In group of <250 persons	54 960	18.8	1.1	34.0	361 664	33.0
	In group of 250 or more persons	4 285	1.5	125	14.9	109 259	10.0
	the contract of the second contract of	10 A. 10 A.	2.6		2.4.0	A 477 A 48	4.7.1

Countries participating in the 2016 Microdata linking project.

eurostat

https://ec.europa.eu/eurostat/statistics-

explained/index.php?title=File:Enterprises_with_fewer_than_250_persons_employed,_by_type_and_country,_2015.png CGC by Professor Peter Lindgren

Green Business Model Parameter Definition

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The term "green business model" as used in our framework and research focus on the **environmental**, **sustainable and circular dimension combine with** the business perspective (turnover – cost = earnings) efficency. Focus is on the Green Business Model construction perspective – so the output becomes operative Green Business Models that are environmentally and economically sustainable through out their entire BM lifecycle.



GBM`s and parameters related to measuring Green Value Proposition

Greening the Businesses and its Business Models must ensure that all businesses in the Business Value network share knowledge, define and understand the term green. They must know about the customer and users, networks wants, needs and demands of the

GBM parameters:

- How green is and should the **material and resource** be?
- -How green is and should the **waste** be?
- -How green is and should the **pollution** be?
- -How green is and should the **biodiversity** be?



Business and its Business value network have different opportunities and possibilities to become green or greener related to BM reconfiguration, design and development. Business have different views, motivations and strategies for greening their businesses.

It is vital to find out, where the business is motivated to begin and kick start the "greening BMI process".

BMI`s levels and GBMI



Figure 3.: BMI Levels and GBMI

GBM innovation and development is in other words about communication, involvement, and deep commitment to continuous GBMI and development across business and BMES boundaries. It often involves many BMI levels and all the business (TO BE BM's) and (AS IS BM's) as shown in figure 3.

Measuring GBM, Sustainable and Circular BM – status today.

However, today nobody is really able to measure GBM parameters precisely related to BMES, Businesses and BM's.

Few technologies and frameworks are able to measure GBM's and the manifold of claimed GBM's - including investments in GBMI projects - if they are "green" – and really "green".

Few technologies and frameworks can yet precisely measure, if a BM have changed into being greener – and definitely not in real time.

Most of todays technologies, green business model measurement frameworks and tools are only able to measure on behalf of estimates (LCA analysis software and standards) (Bjørklund 2002), (Polizzi 2016) and as ad hoc measurements (Greenkey certificates (Greenkey 2022), EU's Green Taxonomies (EU Taxonomi 2021), circular and sustainable standards (Peroni 2017).

In this context businesses and academia are challenged, as there is still no general acceptance on the term green – and what is a GBM. This challenges the 5G and Beyond technologies because no clear GBM standards makes it difficult to calibrate the technology to measure the GBM's on a scale of Green.

The term green seems however to be used everywhere and further also to be much dynamic and changing continuously. Latest EU changed some previous "Black BM's" into being GBM's – nuclear and gas energy BM's - to be able to meet the climate goals of 2030 (Reuters 2022).

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Measuring GBM, Sustainable and Circular BM – status today.

GBM's are today mostly based on estimates and not on real data, which is very confusing for HR, organizational systems and the culture in businesses.

Sustainability and Sustainable Business Models (SBM) (Bocken 2014, 2018) and circular business models (CBM) (Pieroni 2017) are much investigated today – but is also equally to GBM's very challenging to measure – and definitely in realtime.

GBM's are still not defined and our hypotheses is that GBM's are just a part of SBM's and CBM's

as shown in figure beneath



Our hypothesis is that no business and no BM can yet be claimed pure green, pure sustainable and pure circular. However out intension is to measure these with support of 5G and beyond technologies.

Measuring GBM, Sustainable and Circular BM

Few are therefore able to measure and verify "pure green" on all GBM's dimensions, all GBMI levels (Lindgren 2021) and on the entire business value network (Allee 2015).

There are a lack of precise measurement methods, standards, tools and advanced technologies that can enable businesses to transparently and with high security measure and visualize green parameters.

However, there is hope for filling out this gap with 6G and beyond technologies in near future (Henrique 2021).

Upcoming 6G technologies will be able to measure down to millimetres and enable even nano measure technologies to support verification of green in real time.

In this context the purpose of this presentation is to show and discuss how the term green related to BM's is measured with existing technologies and to pin point where some of the challenges lays in other GBM Challenges.

The focus is to begin to investigate more specifically how 5G and Beyond technologies(6G) can support measurement of GBM's in the future

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Kungshamns Fiskarna – Kungshamn, Sweden

Kungshamns Fiskarna



Green Parameter Interest: Energy Consumption

- Focus area; Compressors, ice-machinery cooling houses and storage buildings
- Technical installations first phase
- Measuring Power Consumption and establishing dynamic management of power deliverý
- Temperatur monitoring and dynamic management of temperature

https://www.kungshamn.biz/Guleskaer/Gulesk aer.html





Kungshamn Fisk – Kungshamn, Sweden

Technologies: ReMoni Ressource monitoring system -

How does it work?

In short, the sensors contain a data-logger that sends data wirelessly to the cloud platform ReCalc through ReMoni's gateway.

ReCalc run self-learning alarms, data storage, user interfaces and an API for integration with other solutions. All ReMoni's products are built to be long-lasting and for avoidance of battery replacement.

All our products are tested individually before being shipped from the factory and have been designed, developed and produced in Denmark.













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Salling Auto Genbrug – Skive, Denmark

- Green Parameter Interest: Waste, Materials and ressources
- Up-, Down and Recycling
- Technical challenges first phase
- Business Model Challenges first phase







Greenwalls Practical, theoretical and technical challenges

Challenge 1

Car plastic parts when a car is scrapped

It is difficult to know what are in the plastic parts

Therefore it is incinerated or sent to landfilled without being recycled or upcycled (resold, repurpose)

Challenge 2

Lack of production technology to upcycle or recycle – and scaleup



Rækkemærkater	Samlet vægt (kg)
PP	40,98
PE	4,43
PA	1,37
ABS	5,06
PA66-GF30	0,46
PUR	9,73
Glas	35,85
<u>Other</u>	2,97
Hovedtotal	100,85

Provice rapport, 2021, *IDIS-database do not contain information about quantity of metal. strings e.g..



Efficiency means doing things right but only effectiveness means doing the right things. (Source: EPEA)

The C2C philosophy

Greenwall Practical, theoretical and technical challenges

Challenge 4

Lack of manpower because labor cost is too high to recover the valuable parts of the car Scraping and dumping is less costly and automated than recovering materials

Lack of Production Technologies that can treat the used cars gently through the demolishing process

https://www.youtube.com/watch?v=y3__cghq yOU



Checkwatt, Gøteborg, Sweden

Green Parameter Interest: Materials and resources (Energy production and Consumption)

 Focus area; Energy Balancing, Virtual energypower system, IMD and Control systems

Kategori

- Technical installations first phase
- Balanced Power supply

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ail	Inbåddad visualisering
-	Plug and play visualisering
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CheckWatt

www.checkwatt.se

Frontego, Nykøbing Mors, Denmark

Green Parameter Interest: Energy Consumption

- Focus area; Compressor and Paint systems
- Technical installations first phase
- Power Consumption and monitoring
- Green Power production
- Green Parameter Analysis and monitoring in the entire Business Value network



SMEMEK, Denmark

Smemek would like to use more recycle steel – to be more green - which includes a variety of different steels from **recycled steel** products.

It is a big challenge to measure the quality and content of the actual steel used in the balcony - and in real time. The steel supplier delivers steel due to standards, but there can be very big difference in the steel quality and content from one meter to another meter of the steel.

This causes challenge to get correct LCA measurements, as it can only today be done on estimates and not for the individual part of the steel. It also causes quality and cost challenge as the steel can later on turn into having small spot in the surface that do not look nice in the final product due to some "bad" steel is placed in the spot.

This causes extra work to amend the spot and extra cost for regalvanization and in worst case taking down the balcony repairing it, galvanizing it and setting it up again. This result in extra production processes and thereby increased used of material and resources, increased waste, increased pollution hereunder C02. Therefore, Smemek is challenge with using recycle steel and are looking for methods, technology e.g. that can help them "clime" this Green Wall.







Haderup Skov Service – Haderup, Denmark

Green Parameter Interest: Bio Diversity, material and ressources and Polution (Co2)

• Focus area; Biodiversity, material and resources, Pollution (Co2) and Efficiency

- Protype Technical installations first phase
- Definition on What is Biodiversity?

• How can 5G and Beyond Technology support measuring Biodiversity?



Conclusion

5G and Beyond technologies seems to be able to open up for even more opportunities and values to measuring GBM Parameters – more precisely and in real time.

This measurement can and will in the future be done for the entire Business Model Value networks. Request from Users and Customers, Networks and other stakeholders – EU push to this evolvement.

However we now have to innovate, test and develop technologies on both AS IS BM's and TO BE BM's that actually can support measuring to help passing the different Greenwalls.

There is a large need for reconfiguring, designing and development of advanced product-, service-, production and process technologies – this embedded with 5G and beyond technologies.

However, a clear definition and standards on Green Business Models must be provided.





Questions

Green Multi Business Model and Technology Innovation – with Humans and/or Things?

Professor Multi Business Model and Technology Innovation Peter Lindgren, PH.D. MA Business E₃₉conomics E-mail: <u>peterli@btech.au.dk</u>



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