



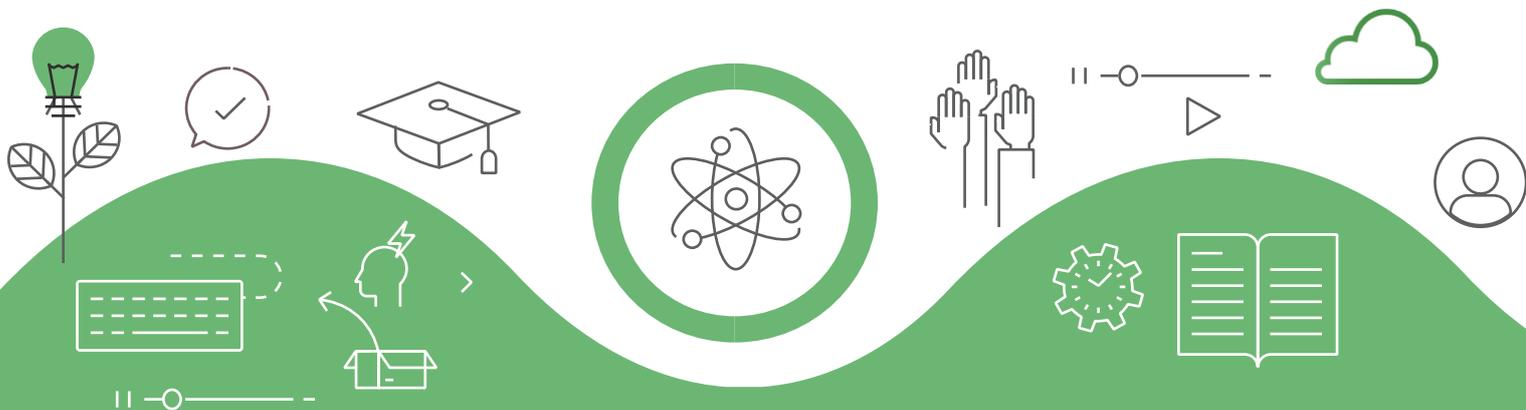
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NO QUESTION: SUSTAINABILITY IS EVERYONE'S BUSINESS
V. BBS International Sustainability Student Conference
Proceeding

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**NO QUESTION:
SUSTAINABILITY IS
EVERYONE'S BUSINESS**

**V. BBS International
Sustainability Student
Conference
Proceedings**

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The role of participation and involvement in organisational learning

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Abstract

Objectives:

In my research, I investigate how and in what ways participation and involvement as a precondition for learning is present in Hungarian SMEs. Effective individual learning is a necessary precondition for effective cooperation both at the individual level and, by extension, at the organisational level. It is through collaborations that the organisational culture that leads to organisational learning and a learning organisation, which is the cornerstone of sustainable development, is created.

Methodology:

In my pilot research, I used a qualitative research method. I conducted five semi-structured management interviews in a medium-sized logistics company, which I then processed applying thematic coding. In this presentation, I explore how decision making is carried out at the company, what decisions are made in the company, how they are made and how employees are involved in the decision-making process.

Findings:

The intention of the CEO is that participation and involvement are consciously present at the company, but I found few real examples of this in the interviews. Important decisions are made by the CEO alone, such as the introduction of a performance appraisal system, but the HR department and members of the management are involved in working out the details. This practice is not conducive to employee participation and involvement in the decision-making process in the company, and thus does not promote a learning organisation culture.

Research/practical implications: My research confirmed that translating knowledge into practice cannot happen without the active participation of the individual. The involvement of the individual and the realisation of effective learning is the starting point for the development of organisational learning and a learning organisation.

Originality/value: Due to the qualitative exploratory nature and the small number of cases used in the pilot research, the results obtained are not statistically generalizable. My aim was to test my idea in practice on a theoretical level.

Keywords: organisational learning, sustainable development, knowledge sharing, participation, employee involvement

Introduction

The foundations of organisational learning were first formulated by Argyris and Schön. Based on their work, organisational learning is the ongoing process in the organisation by which members of the organisation continually monitor their activities and, if necessary, make changes to achieve their organisational goals.

Senge (Senge, 1998) contends that a learning organisation means a working community where individuals strive for constant improvement of their competencies, adopt new ways of thinking that are supported by management. This support manifests itself in a constant focus on ensuring that people are motivated to acquire the ability to learn together. Thus, an organisation is created that is able to achieve sustainable corporate development by enhancing its knowledge and constantly adapting to the environment in order to continuously evolve and thrive.

According to Argyris, organisational learning is none other than “a process of detecting and correcting error”. He contends that the organisation learns through individuals. Our social activity is largely

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influenced by the situation, the interaction between the participants in the situation and their relationship to the situation and the motivation for the activity (Zsolnai, 2013). This is important for the workplace environment because each workplace, with its own culture and rules, creates a workplace “space” in which employees have a framework to perform their work. It is within this framework that employees, as individuals, carry out the tasks assigned to them, and it is within this organisational framework that their social activity takes place in the course of their work. They interact with each other, the individual with the organisation and the organisation with the individual. From a learning perspective, the dynamic interaction between the individual and organisational particularities is called the learning environment at work (Csillag et al, 2019).

A technical prerequisite for creating a learning organisation is the development of a workplace culture in which people learn from each other. This is generally the case in large multinational companies with a large geographical coverage. In my research, I am interested in how this can begin to emerge for Hungarian SMEs where, by their very nature, large geographic reach is not present. In this environment, learning starts with the individual becoming involved in the processes through active attention and participation. In my research, therefore, I am seeking answers to the question of what decisions are made in the company, how they are made and in which decision-making processes employees are involved.

Theory

Learning environment, organisational and social elements of the learning environment

Each workplace creates its own workplace learning environment, characteristic only of it, through the development of its own workplace culture, policies and processes, and leadership by example. The employee who enters this workplace learning environment as an individual also has influence on this organisational environment, formulating or not formulating their feedback on the basis of this influence, and as a result of this dynamic interaction, we can look at the learning environment in terms of whether it is a conducive or a restrictive environment for learning for the individual (Fuller & Unwin, 2003, 2004, Unwin et al, 2010). Each organisation can be placed on a linear learning axis, with one end point being an environment that enhances learning and the other end point being one that puts a constraint on learning. At the point of constraint, employees are not involved in decision-making, and the environment is characterised by a lack of trust and isolation. From the perspective of the learning organisation, the ideal learning environment is one in which the management focuses on creating a work environment where learning is enhanced, where employees are involved in decision-making processes. The 3 main roles of involvement are for employees to be empowered and heard. This process also enables employee engagement to be strengthened.

Participation, involvement

The concepts of participation and involvement are used in a very wide range of ways in the literature and are interpreted accordingly. Therefore, in addition to generalisations, the literature emphasises the need to interpret the specific local features of each case, thus prioritising company case studies (Bácsi, 2017). The guiding principle for my research is the interpretation linked to the economic efficiency model, which argues that the creation of participation can lead to better decision-making mechanisms and greater employee engagement in organisations. Successful participation can be achieved if employees are seen as a strategic resource in the organisation. A number of empirical studies have demonstrated that such practices have contributed to increasing company competitiveness (Artur, 1994, Huselid, 1995, Guthrie, 2001, cited in Bácsi, 2017). Among the 4 approaches to participation (Kaufman and Taras, 2010), the creation of a unity of interests within the organisation is crucial for learning organisations. On this basis, participation aims to create a harmonious work environment in which employees do their best to achieve the company's success. This level can be achieved when organisational and employee goals are aligned and on the same level, there is cooperation instead of competition. This improves communication, increases influence on organisational decisions and improves employee engagement.

The role of participation and involvement in organisational learning

The literature confirms (Dobák, 2011) that the presence of participation and involvement facilitates learning, while its absence inhibits organisational learning. Definitions of organisational learning in the literature include statements about knowledge, definitions of the actions and behaviours of organisational members (e.g., cooperation, helpfulness, self-development) and statements about learning (Keith, 2006). At the next level, the learning organisation, we find a more specific formulation

of learning, whereby it is creative individual learning that generates one of the key components of the learning organisation, the learning process. In this learning process, the members of the organisation are present as a synthesising and catalysing medium (Keith, 2006).

Method

My research was carried out within the framework of research (20405-3/2018/FEKUTSTRAT) conducted by Sára Csillag and her colleagues at the Budapest University of Economics. The researchers analysed the workplace learning processes of small and medium-sized enterprises in Hungary. The university research investigates two main aspects in the emergence of workplace learning. One of them is the role of the owner/manager in the learning that takes place, and the role of the social network surrounding the enterprise in the creation of workplace learning.

In my research, I chose a qualitative research method. In the study of Csillag and colleagues, semi-structured interviews were conducted with the CEO and 4 senior managers of a medium-sized logistics company, selected from a sample taken from a previous representative large-sample quantitative study (Kása et al, 2017). The interviews were conducted online, audio-recorded and transcribed verbatim. The rationale for my choice of method was to understand the wider context of the environment in which learning takes place in the company and to examine the extent and levels of involvement in its local context, which could be used to infer the growth of the company's competitiveness.

The typed texts were anonymised and coded according to a holistic coding procedure (Csillag, 2019). First, I separated the texts according to which ones relate only to the topics of learning, development, participation and involvement. I treated this separately from the information otherwise still obtained during the interviews (company size, stages of company development, knowledge assets, personal career). I isolated the answers obtained under the headings of learning, development, participation and involvement, which were necessary to answer my research, by theme. Accordingly, I separated the answers on learning, development, participation and involvement.

Along this code tree, I also extracted the answers by topic so that they are transparent, and that the presence of irrelevant information does not distract attention and focus.

I explained the purpose of my research to the participants, how the data would be used, and how confidentiality and anonymity would be handled.

I raised open questions in the interview, and I strived not to influence the respondent with my questions in order to get an expected correct answer. For the purpose of my research topic, I grouped my questions around the following themes:

My questions were built around the theme of participation and involvement. First of all, I wanted to find out what examples my interviewee could give of how decisions on important issues are made in the company. To what extent is cooperation planned and to what extent is it contingent. What is the experience with employee involvement and are there any positive/negative examples of this in the company. I wanted to find out whether there is a customary decision-making process at the company, what channels are available for employees to express their opinions.

Since in my research I have referred to the fact that the literature on participation and involvement draws attention to the need for contextual analysis, a brief history of the selected company follows.

The company's predecessor was also involved in warehousing and logistics before the change of regime. As part of an employee privatisation scheme, it was employee-owned until 2017, when it was bought back from the then retired employees by a financial investor who arrived in 2017. This is the beginning of a distinct **period of development** in the company's history, as the mindset of the financial investor is completely new, as the director put it: "*The change in '17 was typically a change in mindset, because the new owner, as a financial investor, wants to know exactly what the return is on each asset. To do this, a lot of these parallel operations that had evolved over many decades were chopped off.*"

In the present market conditions, the distinctive feature of the company being studied is its ability to provide warehousing and logistics services for products requiring specific unique logistics needs, while meeting the customer's individual requirements. This includes everything from telephony to heavy machinery handling and logistics for exhibition equipment. Since 2019, they have been consciously carrying out organisational development to achieve their goal of becoming a digital logistics service provider, thus differentiating themselves from their competitors.

Results

The role of the manager in participation and involvement

Just as the key role and level of commitment of the leader to the learning processes of the company emerged as a published result in the academic research (Csillag et al, 2020), I found the same pattern in my pilot research in terms of participation and involvement. Here, it was mainly the introduction of the performance appraisal system that triggered a major change, as it was here that behavioural expectations were formulated that would facilitate involvement and participation. The positive impact of the programme was clear from the feedback provided by the CEO.

“this kind of transformation, let’s say change,they start to own up, recognise and take responsibility for their own decisions.” (C5/1)

He described his commitment to involvement through a personal example from the past, where he experienced that empowerment and trust led to participation and involvement, which was a surprise to him, gave him a sense of achievement and motivated his staff.

... “and it was surprising to me how much they opened up to the task and because of the incentive and they were very good at selling what they had bought.” (C5/1)

So I saw specific examples of full engagement and implementation in terms of participation and involvement in the CEO. The picture is slightly more nuanced for other members of the management team, there is a willingness to create participation and involvement, but practical examples of this actually happening are not yet widespread.

“I’ve always been very keen to make sure that involvement works, because I believe that a project can be successful if you involve as many people as possible, then it absolutely works.” (C5/4)

*“...I try to discuss a lot with colleagues about **my own ideas and thoughts**, what they see, what pitfalls, what advantages could be gained by introducing it.....” (C5/4)*

The above quotes show that they have ‘learned’ that this is what needs to be done, but as long as the wording is that it ‘should’ happen, the intention is there, but the result will not be participation and involvement.

In several cases, I have seen that achieving participation and involvement is perceived as a management task, they think they are doing it, but they are not actually doing it in practice.

*“you do need to ask colleagues, **probe, gather** information.....”*

*“...they should give **information on a daily basis, when a decision needs to be made, there should be a senior manager present** who can make a decision on a daily basis right away.....” (C5/4)*

And I found someone who used this example for involvement:

“I went down to the warehouse, I got a team together, and well, I had to do a little bit of wrangling and discuss what the deficiencies were, and I visit a number of areas and I often ask for their opinions, and they’re very willing to come forward and I believe in this.”..... (C5/4)

I consider it to be supportive of organisational learning when knowledge can be translated into practice, in this case when participation and involvement takes place in practice. We see good practices in this regard in the organisation, but only in relation to the CEO and the senior management team. I did not find good practices on participation and involvement between senior management and their subordinates.

Presentation of forward-looking elements of the learning environment

Learning and development are one of the values of the performance appraisal system implemented at the company, which demonstrates the company’s commitment to learning. The expectations from employees encompass the need to strive for new knowledge, to want to be better from day to day, to understand the interrelationships between different areas. To develop the skills needed to achieve these, where necessary, the manager and the employee draw up individual development plans in performance appraisal meetings and monitor their implementation.

I have learned a lot from my colleagues and immediate superiors, and it’s not just about dealing with people and communication, it’s also about learning the profession itself, or mastering it. And this, like many other areas of life, is a never-ending learning process. So you never get to the end of this, I think you can never sit back, and anyone who sits back can make a big mistake, because things can slip by. So if I can put it in such a very clichéd way, life has taught me this, and it took a certain amount of self-discipline to polish certain things, certain corners. (C/2)

The knowledge acquired is assessed, and out of the 5 values set, employees can nominate 1 employee who they think is the best example in at least 2 values simultaneously. The nominee with the most votes will receive a public award at the annual review conference.

“We also gave our employees a nice commemorative package and we gave our employees a reward and it motivates them and it’s very, very nice recognition, I think. And we want to do this every year.” (C/2)

In order to acquire qualifications, the workplace organises both on-the-job and off-the-job training courses on an ongoing basis. The diversity of training courses shows the company’s commitment to developing all professional, business and interpersonal skills.

- Forklift driver course (for warehouse workers)
- Excel course (for administrators)
- Power Pivot online training (for controller)
- Invoicing administrator training (for finance staff)
- Equal Opportunities Officer Training (for HR staff)
- Finance workshop (for the CFO)
- Business Communication, NoPara mini trainings (for office workers)
- First aid at work training
- Defibrillator training

Training for managers:

- Delegation training
- What is good leadership training
- Proactivity training
- Cooperation training

Among the values articulated is innovation which is vital for a forward-looking learning environment. This is encouraged through the placement of an idea box, with specific management support.

“I think that you can make your colleagues aware of the untapped opportunities in this profession, of the innovations that are interesting, and with this kind of interest you can create an openness in them, which they can use to create their own (so, I have a colleague who enrolled in college on his own, he has the patience for it, he’s started it by distance learning, for example). Some people also follow these professional forums. We also discuss things that might be of interest to them, and those who are open to it start to take it up themselves.” (C/3)

Involving management practices

They operate multiple communication channels. There are circulars in which policies and instructions from the director are shared. This is a form of one-way communication. In the weekly meeting system, the manager organises meetings within management, involving HR, where they review current tasks and any difficulties. Meetings with the foremen are also held on a weekly basis and can be organised more frequently on an ad hoc basis as required. The quarterly performance review meetings also provide an opportunity for two-way communication. Once a year the CEO holds an annual review. The agendas for the annual review have not changed for several years, with all areas of expertise being presented by the CEO (HR, logistics). The externalities of the annual review conference do not reflect the commitment of the CEO to increase involvement (i.e. HR would be presented by the HR manager, logistics by the logistics manager).

Based on the above, we can say that involvement in decision-making is understood as creating a so-called “culture of conversation” (...Csillag S). It is seen as an organisational development task for managers to ensure that two-way feedback between manager and subordinate takes place during performance reviews, along the lines of the objectives set there. However, this cannot be expected to create trust in a long-established corporate culture where it has been absent but will now be created through the performance appraisal discussion.

At the senior management level, the intention to increase the level of involvement has been stated, which is a very important step, but since the CEO himself does not consider HR as part of management (who is currently a female HR manager) when he talks about the male-female employee ratio on another topic, there is still a long way to go to achieve real involvement in this culture.

“The male-female ratio is above average for the profession, but much to my regret top management does not include any women, everywhere else there are women as forepersons, warehouse managers, they are at all levels...” (C/1)

Institutions, scope and extent of participation

In the company being studied, institutions of employee participation provide employees with opportunities to have a say in their work processes or in the design of their working conditions and to express their ideas (Bácsi, 2017). This form of direct participation is seen as a leadership tool in the company under study and the performance appraisal meetings are regarded as an opportunity for employee participation.

“there is an idea box, and I don’t know, they appreciate ideas and stuff, but I’m telling you, telling employees to come up with ideas and then saying, listen, you’re stupid because you understand only part of it, you shouldn’t tell them that because it’s totally demotivating afterwards. Then it’s better not to ask them at all or they shouldn’t be asked through those means and in that context. So you should not expect them to come up with ideas, but to be able to voice their opinion, and then there will be someone to listen to it and take it further in an informed way. But anyway, the direction here in terms of organisational development is that as far as possible all ideas should come to a level where we can consider them in a meaningful way, because a lot of times the warehouse worker would say something to the shift supervisor and he would sweep it off the table saying that this is not the way it is, the boss said otherwise. Now they have the decision-making competence, it’s much more difficult not to say that the boss didn’t say this, but to say listen, I’ll escalate it to the next level, so we can discuss it there and decide whether it makes sense or not, whether it’s relevant or not. So there is such an intention and I think it’s good, but I’m just saying that we have to give it a limited amount of space, because then the great ideas will come.”

In terms of the extent of participation, there are also examples in daily practice where workers have an indirect say in decisions at company level through forepersons.

“...the direction is set here, the ideas, and then it is finalised in a joint forum with the involvement of middle management, if you like. But what the direction and the goal are, is decided between the three of them there, and obviously with the owners, and then how we will achieve this, how we will implement it, is put together through joint planning and joint strategic consultation.” (C/3)

The thoughts of the CEO on this topic:

“... there is that level where they have to decide, so we unload a truck, what’s the order, where do we put it, etc., it’s their decision. But in order, say, for a logistics system to work well, they must be involved at the level of opinion, but they must not be the deciding factor, because not everyone can think in context, not everyone can see beyond their own desk, and we are talking about logistics tasks here.....”

It is clear from the above that the CEO considers participation/involvement as a management motivation tool, in practice involvement is implemented indirectly by mid-level managers and in terms of its extent it is more of a means of providing access to information to the employee.

In terms of the degree of participation/involvement, the two extremes are that the employee has a direct say in management decisions and the other extreme is that involvement is simply access to information for the employee. At the company in the case study, we start from the latter endpoint and find the following empowerments (Bácsi, 2017).

- information forums

Staff are informed verbally or in writing of the content of decisions and the reasons for them. The company prefers verbal exchanges of information, so that in principle there is a possibility for feedback from employees.

“Before this quarterly evaluation was prepared, where not only their own work is discussed, but they can also voice their opinion on how they see things, be that in terms of the progress of the company, their own area, or their line manager. There are status meetings with the shift managers every day, and in addition to the daily ad-hoc issues, we also discuss tasks that are anticipated in the future, so if we involve them and discuss these together, they can tell us what they see in this regard, and together we can discuss what the solution could be, or what other proposals we should make to move forward, so these channels are there too.” Krisztián

- opinion forums

Management retains the power to make decisions, but employees are also consulted and listened to, so in principle they have the opportunity to express their views. This is implemented at the company under review through an ‘open door’ culture and quarterly appraisal discussions.

“I have my door closed now, but normally it’s open, you know, the secretariat is here, colleagues come in, say hello. If they’ve come from far away, from another location, they stay a little longer, if not they just say hello, but otherwise they see me because I go to different sites, let’s say that every 2-3 weeks definitely, which means the company manager is not there only when there is a problem, but also when he’s just checking on them to see how they’re doing on a completely normal day and then he is also”

available for conversation, approachable and this doesn't only apply to me as a manager, but to all the other managers as well. So you have to appreciate people as people, I think....."

I found no examples of a consultation and co-decision forum during the interviews.

The relationship of vocalisation and silence with participation

How much say employees have, whether they dare and want to have a say in decisions depends on a number of factors, but the literature suggests that the employer's attitude is a key factor. If silence is prevalent, the employee does not have the freedom to express his or her opinion and, as a consequence, management does not have enough information to make decisions. On this issue, it is important to look back at the history of the company, which includes a long culture of one-man decision-making, the presence of many long-time employees in the current company, which goes hand in hand with 'keeping quiet'. For them, keeping quiet was natural. They made great progress in organisational development on this issue by achieving employee engagement, which is now in the form of automatic and continuous brainstorming.

"So it's important that they get feedback on their experience of it, on their practical experience, whether it's their idea or not their idea, in any case. I mean, on some level I do try to allow my colleagues some space and say, do it, show us and then let's talk about it. If it doesn't turn out well, we discuss why it didn't go well. If it turns out well, you get all the credit for it." (C/3)

Successful organisations are those that involve, empower and listen. This allows the employee to be a source of knowledge. Participation creates a sense of belonging in the employee which is motivating.

"the direction is set here, the vision, and then it is finalised in a joint forum with the involvement of mid-level management, if you like. But what the direction and the goal are, is decided between the three of them there, and obviously with the owners, and then how we will achieve this, how we will implement it, is put together through joint planning and joint strategic consultation." (C/3)

The relationship between employee autonomy and participation

According to the literature, the level of employee involvement in decisions depends on 4 factors (Bácsi, 2017).

- **Power of action:** in all aspects of work, it gives employees the opportunity to achieve greater autonomy and control over their work.

In the company under review, results tracking software is used to achieve continuous control of work up to middle management level. By involving employees in the process of making weekly commitments to achieve corporate goals, commitments can be tracked by managers to achieve the corporate goal and this information shared among employees also allows for active two-way feedback.

"This Objective Key Results, it's an English acronym, it's a, well, I would say it's a mindset. Think of it like a GPS. So it's a way of thinking and a structured agenda to achieve the goals we have set, a GPS that will guide us through the process of achieving our goals. The way to think of it is that there is a software where essentially the commitment of each manager is recorded, aligned to the goals. So we have set these targets at management level and then we start to slice and dice these goals to determine what it takes to achieve them. What are the tasks that need to be done? Who needs to do these tasks?" Pamucsi

"..... each week, where we look at the extent to which the commitment made by a particular manager has been achieved, and if not, why it has not been achieved, for example because the goal was wrong or there were some complicating factors...." (C/4)

- Employees need the right information to make the right decisions. In the company under review, this is provided, albeit only through a narrow channel. Given that we are not talking about a knowledge-intensive company, a relatively small number of information channels that work effectively may be sufficient to achieve effective participation.
- In order to achieve organisational goals, an appropriate reward system needs to be operated uniformly throughout the company.

This is being implemented at the company under review now. Currently, there is a monthly moving wage which is not linked to performance. A bonus system based on objective indicators will be introduced in 2022.

"Now, this new objective bonus system that I wrote about among the tasks planned for 2021, when I wrote this, it was indeed planned. However, 1-2 weeks ago I consulted with the warehouse operations manager and they said that they would like for it to be pushed out to 2022. We have started working on this, but we will not be able to implement it this year. That being said, we have a monthly moving wage table that will allow our employees to be eligible for monthly moving wages. We have bonuses, which are based on facts and figures, but we have pushed this new objective bonus system to 2022." (C/2)

- Knowledge of the work, the performance of work system and the process in the company is required. This requirement seems to be met in the company under investigation, based on the above.

In summary, the organisational development currently in place lays the foundations for employee involvement, the implementation of which is then up to the employee. Building trust is also necessary to foster employee engagement.

Conclusions

In line with the literature, my own research has confirmed that when the management decides to put participation and involvement into practice, a process, a learning process is initiated in the organisation, whereby employee engagement increases by giving them a say in decisions.

In my research, I divided the patterns of participation and involvement into two groups within the management group: one is the responses from the CEO and the other group is the responses from the senior management team. The intention of the CEO is that participation and involvement are consciously present, and I found practical examples of this being achieved in the other interviews. I detected a conscious shift towards the development of managerial feedback practices, where the employee and their manager are presented with an opportunity to discuss performance in a pre-agreed format and structure. This discussion also provides an opportunity to give continuous feedback to each other, which is a prerequisite for an effective learning process. This practice creates an equal partnership between the CEO and the senior managers, which is a prerequisite for participation and involvement.

With regard to the senior management team, the manager consciously thinks of engaging the staff in decisions. However, when I asked for a list of specific examples, it became clear that in their understanding, involvement means sharing your own idea with your colleagues and gathering employee feedback on your idea. In this case, involvement and participation are not put into practice, the organisation is at the beginning of its journey of building a workplace environment that supports learning.

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Marketing plan making for EXXONMOBIL

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Abstract

Low oil prices have an impact throughout the whole business for ExxonMobil. Oil costs straightforwardly affect the second large issue confronting Exxon keeping up with saves. It is well established that represents the good marketing concepts for all the competitive markets. ExxonMobil is focused on giving solid and reasonable energy to help human advancement while carrying out and progressing compelling answers for moderate natural dangers. The study on ExxonMobil aims to determine a well-known marketing plan for existing businesses on the international level. This study will introduce the new marketing plans implementations in this pandemic situation. I will introduce internal analysis, external analysis, STEP analysis, Porter's five forces model, key internal forces, internal SWOT analysis, BCG Matrix, and QSPM model. These all types of research will show the progressive information and will show the real marketing information which should be applied according to research and methods. ExxonMobil is committed to providing constantly good quality and affordable energy to support human progress while implementing and advancing effective solutions to decrease environmental risks. ExxonMobil claims that it contributes to social welfare worldwide by efficient production of energy and chemicals, community outreach programmers, and high performance on HES. The company has not changed this arrangement, yet it has as of late added human rights to its arrangement of corporate obligations. While this new component has not prompted any critical changes in corporate standards and systems, ExxonMobil's association with the World Bank in the Chad-Cameroon pipeline project shows a change in how to foster undertakings in amazingly poor nations. Then again, that venture is seen as very extraordinary and may not enlighten us much concerning any conventional changes.

Keywords: SWOT analysis, BCG Matrix, QSPM model, Chad-Cameroon pipeline project.

Introduction

Exxon Mobil is one of the world's most powerful oil firms. They operate oil rigs and refineries in several nations. Exxon sells to a variety of gas and petroleum companies. They also create a variety of things on their own. Exxon marketing is a challenging and time-consuming procedure.

Exxon has a variety of target markets at various levels. With the raw oil they're pumping from the rigs, they're going after gas and petroleum firms. This market's targeted characteristics and methods are difficult to come by. In this case, it appears that the target market comes to Exxon. The next step is to target specific markets for their own products. Exxon is a company that manufactures both petroleum (gas) and oil products. Consumers who drive any form of vehicle would be the target market for these products.

Exxon divides them into target groups through market segmentation. They are primarily targeting diesel and gas customers as petroleum consumers. There are two markets to target within the diesel consumer segment. There are two types of diesels: farm grade and over-the-road grade. The agricultural business's consumers and the commercial trucking industry are, of course, the target markets for these. It gets a little trickier in the petroleum industry. Oil is also utilized in gasoline and diesel engines. Exxon will again target the diesel and gas user industries, but this time it will segment the market by engine size and life cycle stage.

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When it comes to promoting their product to consumers, Exxon, like any other company, has a position that they adhere to. Their positioning strategy is like that of any other company in their field. Exxon claims that their product is the most environmentally friendly while also being the best for your engine.

When it bought Enco and Esso in 1972, it got the moniker Exxon. After then, they joined with Standard Oil Inc. to form Exxon Mobil. Exxon was formed by the merger of Enco and Esso, while Mobil was formed by the merger of petroleum products, keeping you Mobil. It's a memorable brand name that also describes where it came from. The two x's make it easy to recognize. It's also pretty simple to say.

For more than 30 years, Exxon Mobil's products have been in the growth and maturity stage. The petroleum and gas industries aren't going away anytime soon. In fact, it will continue that way until we find a better and more stable alternative energy source for transportation. The only time the lifetime stage can be lowered is during a recession or economic downturn.

Exxon's pricing philosophy is based on the principle of "you get what you pay for." Exxon is confident in its product and stands behind it. They are aware that they are not the cheapest, and they do not expect to be, but you will receive excellent value for your money. This is particularly true with their synthetic vehicle oil. They cost a dollar more per quart than another brand, but they still sell more than their competition. They clearly know what they're doing when it comes to pricing because their product is still at the top of the market.

Technical literature review

Exxon set up as the new bound together brand name for all previous Enco and Esso outlets. The Esso name was a brand name of Standard Oil Company of New Jersey and drawn in fights from other Standard Oil side projects due to its phonetic likeness to the abbreviation of the name of the parent organization, Standard Oil. Exxon Mobil is the world's biggest public oil and gas organization. The Irving, Texas-put together organization works with respect to six landmasses and in many nations. Exxon Mobil is likewise one of the world's biggest compound makers, making items like engineered rubbers, modern alcohols, and solvents. Exxon Mobil was established on November 30, 1999, and till now it is included in world best organizations. On February 2, 2018, the proposition cost of ExxonMobil fell by 5.1 percent, its most recognizably horrendous single day fall starting around 2011. The drop in share cost was set off by the appearance of the association's 2017 last quarter benefit. The association missed the benefit suspicion, at this point what's more reported a rot of 3.2 percent in oil creation. Creation in the US tumbled to 244,000 barrels every day. In the last quarter of 2017, ExxonMobil reported a net addition of \$8.4 billion diverged from \$1.7 billion in a comparable quarter in 2016 - an augmentation of \$6.7 billion. While various agents were worried about ExxonMobil's future improvement potential thinking of it is not extraordinary financials and declining share esteem, some were of the view that the association had the option to find and encourage immense energy stores gainfully. The overall interest for oil extended by 1.6 million barrels every day in 2017 to show up at 98 million barrels all year long. Throughout the span of the ten years, the typical extension in consistently overall interest for oil was 1,000,000 barrels. ExxonMobil had broadened that by 2040, the overall oil solicitation would augment by 20% to contact 118 million barrels every day. In March 2019, ExxonMobil declared that it would refresh its development plans. It anticipated that its yearly profit potential should increment by more than 140% by 2025 from the 2017 changed income, on assumptions for an oil cost of \$60 per barrel and in view of 2017 edges.

ExxonMobil Chemical spotlights on feasible arrangements in light of tried-and-true strategic approaches. The center components of its business technique include:

- Predictable spotlight on conveying functional greatness
- Expanding on innovation initiative
- Exploiting benefits from the ExxonMobil incorporated model
- Contributing with knowledge and discipline

ExxonMobil's undertakings were truly impacted by the COVID-19 pandemic in 2020 as the resulting overall monetary withdrawal incited a breakdown in energy utilization. The association posted a yearly all out deficiency of \$23.3 billion stood out from absolute pay of \$14.8 billion in the previous year. Those figures join results for the association's non-controlling interests. Income for the year fell 31.5% to \$181.5

billion. The U.S. delivered 35% of full-scale bargains and other working pay, while countries in the rest of the world made 65% of the total, drove by Canada, the U.K., and Singapore. On February 1, 2021, ExxonMobil proclaimed that it had made another business, named ExxonMobil Low Carbon Solutions, to promote its expansive low-carbon development portfolio. ExxonMobil plans to contribute \$3 billion through 2025 on lower-outpouring energy courses of action. The new business will at first focus on carbon catch and limit (CCS), an essential advancement expected to achieve net-zero transmissions, one of the huge targets of the Paris Agreement on ecological change. CCS advancement gets CO₂ from current development and injects it into significant geological improvements for enduring storing. On February 24, 2021, ExxonMobil announced that it had assented to a course of action to sell a large portion of its U.K. besides North Sea non-worked upstream assets for Norway-based private-estate save Hitec Vision AS for more than \$1 billion. ExxonMobil said it means to focus in on its advantaged projects. The game plan is depended upon to local the focal point of 2021.

Materials and methods

SWOT Analysis:

SWOT analysis is a framework for identifying and analyzing an organization's strengths, weaknesses, opportunities and threats. These words make up the SWOT acronym.

I choose the SWOT analysis because it is the most basic situation analysis method. That the cause I used it.

The primary goal of SWOT analysis is to increase awareness of the factors that go into making a business decision or establishing a business strategy. To do this, SWOT analyzes the internal and external environment and the factors that can impact the viability of a decision. (Fine, 2010)

TOWS Analysis:

A TOWS analysis is a variant of a SWOT analysis and is an acronym for Threats, Opportunities, Weaknesses and Strengths. (*TOWS Analysis: A Step by Step Guide - Oxford College of Marketing Blog*, n.d.)

A TOWS analysis, like a SWOT, will involve identifying an organization's strengths, weaknesses, opportunities, and threats; however, one of the most common criticisms of a SWOT analysis is that it fails to highlight the links between the various aspects and categories. A specific threat, for example, could amplify the impact of a flaw. A TOWS study, on the other hand, will try to match internal and external characteristics in order to uncover relevant strategic choices for an organization to pursue. It can assist a company in identifying opportunities, reducing threats, overcoming weaknesses, and maximizing strengths.

Internal Factor Evaluation (IFE) matrix:

Internal Factor Evaluation (IFE) Matrix is a strategy tool used to evaluate firm's internal environment and to reveal its strengths as well as weaknesses in the functional areas of a business. (Jurevicius, n.d.)

It also serves as a foundation for recognizing and assessing connections between those domains. The development of an IFE Matrix necessitates intuitive judgments, thus the appearance of a scientific approach should not be taken to imply that this is an all-powerful strategy. More important than the exact figures is a detailed knowledge of the issues involved.

External Factor Evaluation (EFE) matrix:

External Factor Evaluation (EFE) Matrix is a strategy tool used to examine company's external environment and to identify the available opportunities and threats. (Jurevicius, n.d.)

Marketing planners can use an External Factor Evaluation (EFE) Matrix to summarize and assess economic, social, cultural, demographic, environmental, political, governmental, legal, technological, and competitive data. The EFE Matrix shows whether a company can effectively exploit current possibilities while limiting external dangers. It will also assist strategists in developing new strategies and policies based on the company's current situation.

The Internal Factor Evaluation (IFE) Matrix together with the External Factor Evaluation (EFE) Matrix is a strategy-formulation tool that can be utilized to evaluate how a company is performing in regard to identified internal strengths and weaknesses of a company.

IE matrix:

The internal external matrix positions an organization's various divisions in a nine-cell display. (*Internal External Matrix - Hmhub*, n.d.)

The IE Matrix and the BCG Matrix are similar in that they both entail plotting a firm's divisions in a schematic diagram; therefore, they are both referred to be portfolio matrices. In addition, the size of each circle in both the BCG and IE Matrices represents the proportion of sales contribution of each division, whereas pie slices disclose the percentage of profit contribution of each division, but there are some variances. (*The Internal-External (IE) Matrix – HKT Consultant*, n.d.)

BCG matrix:

The Boston Consulting Group Matrix (BCG Matrix), also referred to as the product portfolio matrix, is a business planning tool used to evaluate the strategic position of a firm's brand portfolio. The BCG Matrix is one of the most popular portfolio analysis methods. It classifies a firm's product and/or services into a two-by-two matrix. Each quadrant is classified as low or high performance, depending on the relative market share and market growth rate. (*BCG Matrix - Overview, Four Quadrants and Diagram*, n.d.)

Space matrix:

SPACE Analysis is an analytical technique used in strategic management and planning. SPACE is an acronym of Strategic Position and Action Evaluation. The analysis allows to create an idea of the appropriate business strategy for the enterprise. The analysis assesses the internal and external environment and allows designing an appropriate strategy. (*SPACE Analysis - ManagementMania.Com*, n.d.)

The analysis describes the external environment using two criteria:

1. Environmental Stability (ES)
2. Industry Attractiveness (IA)

The inside environment is also described by two criteria:

1. Competitive advantage (CA)
2. Financial Strength (FS)

QSPM matrix:

Decision stage is the last stage of strategy formulation in which a tool is used called Quantitative Strategic Planning Matrix or QSPM Matrix. Hence there are a number of alternative strategies and the Quantitative Strategic Planning Matrix (QSPM). (*QSPM Matrix - Quantitative Strategic Planning Matrix*, n.d.)

It may be used to objectively assess the most appropriate method from a list of all the alternatives. As a result, data is gathered, and a matrix is created for strategic planning utilizing quantitative approaches. As a result, the QSPM Matrix is based on identifying the external and internal critical success factors. Only the carefully devised technique of QSPM Matrix can determine the relative attractiveness of plausible alternative actions.

Vision Statement:

"To safely and responsibly meet the world's growing needs for energy and high-quality chemical products." While this is not the official vision statement, it represents what the corporation considers critical for maintaining the value of its business operations.

ExxonMobil Vision Statement Analysis:

ExxonMobil is extremely specific to where it needs its future to make a beeline for, and it needs the workers and the investors of the organization to know something similar. They expect to impart a brilliant future to individuals who buy their items and are continuously meaning to get the job done their investors' requirements by making an honest effort to remain in the market pattern. Along these lines they are extremely specific in their endeavors to lead the economy and ensure the organization streams in the best bearings.

The vision explanation is inferred as "to securely and mindfully meet the world's developing requirements for energy and excellent compound items." There are two primary components we will be breaking down in this vision proclamation. Those components will let us know what the organization focuses on its future and what it will give as far as advantages to its customers. The components are: -

- To meet the world's growing needs safely and responsibly.
- Energy and high-quality chemical products.

The principal explanation discusses the organization is truly outstanding in paying attention to the necessities of their country while likewise ensuring their administrations arrive at the world's economies and make them benefit. Gas and oil are extremely unpredictable and delicate things to deal with. A basic blunder to a great extent can prompt holes and blasts, as has occurred with many organizations. ExxonMobil focuses on dependably taking care of those unstable wellsprings of energy and dependably transport them all over the world with lesser harm than most organizations. Along these lines, making it one the most capable oil transporting organizations universally, getting them overall acknowledgment and huge loads of benefit in their shipments. They have attempted to have an effect both ecologically and financially in their undertakings. The consecutive component discusses providing the organizations with energy, in addition to any energy sources, superior grade and reliable sources that will assist the headway of their organizations and help with driving their future and ensure they have a decent run utilizing their items. The comparison between most energy-delivering organizations and ExxonMobil is that they are submitted completely to give excellent energy sources.

This present organization's aim occupation is to give organizations and economies the best quality items regarding energy and gas. Their entire standing depends on the way that they give great raw petroleum and a skill for being the most incredible in managing energy items. Regardless of whether they give the best, they need to keep up with their notoriety because of the economies depending on their inclination to be predictable with their items. They keep away from numerous things, one of which isn't making false responsibilities and ensuring they don't withdraw on the responsibilities they made. This has consistently assisted them with making guarantees and be safe with regards to their showcasing and business choices while additionally giving them a decent standing.

Mission Statement:

The mission is to provide quality chemical products and services in the most efficient and responsible manner to generate outstanding customer and shareholder value while remaining committed to the principles of sustainable development. [1]

ExxonMobil Mission Statement Analysis:

ExxonMobil Mission Statement has not founded legitimately yet given its accurately of encounters and the information formed on its site, we can figure out a mission statement. Their mission statement will rotate around making the world capable and practical using crude petrol and their oil things. Their focal objective will similarly focus in on using energy sensibly and growing the lifestyle by giving sensible energy sources. Their statement of purpose will seem like this, "Providing energy to the world's economies at a reasonable rate. Dealing with every one of the difficulties for giving energy, and taking care of those issues in a functional, protected, dependable, social and earth satisfactory way." There are 3 components we want to examine in this assertion.

- Giving energy to the world's economies at a reasonable rate.

- Figuring out every one of the difficulties.
- Tackling issues in a useful, protected, dependable, social, and harmless to the ecosystem way.

The essential part is giving energy to the world at a monetary rate. Oil and Gas are the principal factors required for any economy to finish its regular limits. Additionally, assuming the expenses for those are at an unparalleled high, people can't tolerate evening the barest necessities. Therefore, this association should target providing clients with the best idea of oil and gas at sensible rates.

The central thing for any energy-giving business is getting customers and giving gas and oil at a sensible rate. Getting customers ends up being basic in the event that the things are sold for a minimal price.

Meeting troubles and handling them for the association and its laborers is one of the association staff and the owners' most critical parts. It grants them to talk with each other and ask how is to be dealt with how the issue is to be handled. Assuming correspondence is missing, the association will successfully break down away. Miscommunication and nonappearance of correspondence is an outrageous test that every association ought to go up against. There are various challenges the gathering ought to face. Considering everything, they connect with monetary circumstances, material availability, moving issues, monetary instabilities, design change, pay stream, and an augmentation being used. Thus, the utilizing models for ExxonMobil are amazing and require gigantic data accessible and the things the association sells. Dealing with the issues of the association and meeting the troubles go inseparable. Nevertheless, handling issues in the way referred to above requires an enormous proportion of resilience and commitment towards the association. Being practical means considering reasonable courses of action without harming the delegate and their plan and completing faster work. Prosperity and reliability go together and ensures the security and continuation of the association name after exercises. On the other hand, innocuous to the biological system exercises are incredible for the prosperity and persistence of the environment. Thus, most associations need to guarantee their organizations are according to the customers' prosperity and trustworthiness. This does a consistent proportion of business for the associations and ensures the affiliation's livelihoods without any obstructions.

External analysis

External analysis is carried out by the organization in order to discover external risks and opportunities. External risks are those that are unknown, difficult to identify, and that the company does not control. External risks offer a significant danger to businesses, particularly strategists, because they make long-term planning difficult. Most industries are confronting rising uncertainty because of the external environment's rapid changes and complexity.

The goal of the company's external audit is to compile a list of potential opportunities and hazards to avoid. External audits are designed to assess only the critical aspects that require the firm to take real countermeasures so that the company can know how to respond best and whether to pursue an offensive or defensive strategy, as the term "limited" implies. When undertaking an external audit, the company needs collect enormous amounts of data, which necessitates employee and senior management involvement.

STEP Analysis:

Beyond a competitive advantage, the pestle analysis provides extensive information about the operational issues ExxonMobil will face in a general macro environment. For example, an industry may make a lot of money with a strong growth trajectory, but it will not help Exxon Mobil if the political situation is uncertain. Repsol, the Spanish oil company, is in a similar dilemma. It began operations in Argentina with above-average profitability and attained success. In 5-7 years, you might expect to make a lot of money. The enterprise, however, was later seized by the left-wing government. As a result, the ten-year profit was not realized in the end.

Social factors

The culture of society and the style of doing things have an impact on the culture of environmental groups. ExxonMobil's marketers use shared beliefs and attitudes to better understand customers in specific markets and create marketing messages for key oil and gas consumers. The skill level and

demography of the target group that the organization wishes to attract are the first significant social factors to consider. In society, the hierarchy, class structure, and power structure are all essential social variables to examine. The education level of the company and the education level of the employees.

Technological Factors:

The subculture of society and the style of doing things has an impact on the subculture of environmental agencies. People's common views and attitudes play a critical role in how ExxonMobil's executives identify clients in certain markets and construct advertising messages for key customers in the oil and gas business. The first social component to consider is the level of talent and demography of the target population that the agency must reach. In addition to hierarchy, type structure, and electricity shape in society, there are other important social variables to consider. The company's education and training degrees.

Economic Factors:

The combination demand and mixture investment of an economy are determined by macro environmental factors such as inflation rate, financial savings rate, activity rate, international trade rate, and financial cycle. While micro environmental factors such as opposing norms have an impact on the firm's aggressive advantage. Exxon Mobil Corporation can forecast the boom trajectory of not only the sole zone but also the organization by using country financial elements such as growth rate, inflation, and industry financial warning signs such as major integrated oil & gas enterprise boom rate, patron spending, and many others. Aside from that, the exchange rates and balance of the countries in which the business works are other important financial factors to consider. ExxonMobil must decide whether it wants to raise cash in the local market or not, and the efficiency of financial markets is one of the monetary factors to be considered. In the huge integrated oil and gas business, the infrastructure is extraordinary.

Political factors:

Political factors have a significant role in determining the factors that can affect Exxon Mobil Corporation's long-term profitability in a specific United States or market. Exxon Mobil Corporation operates in large integrated oil and gas in more than a dozen countries, exposing it to a variety of political environments and political gadget risks. The key to success in such a dynamic major integrated oil and gas firm operating in numerous foreign locations is to diversify the political environment's systematic threats. Political stability and the economic importance of the country's key integrated oil and gas region.

Anti-trust legislative standards for huge integrated oil and gas companies are also an important political consideration for the organization. Every other political issue that may influence the organization, particularly corruption in the law levels in the basic materials industry, is the risk of navy invasion corruption. Interference and bureaucracy by the government in the huge integrated oil and gas enterprise is a political issue that the company should handle.

PORTER'S Five Forces Model:

Michael e. Porter developed the five-a-side competition framework in 1980, and it has since become a significant aspect of the strategic planning process. This model establishes each industry's competitiveness and explains why different industries can achieve and maintain varying levels of profitability.[2]

Competition in the Industry:

The number of competitors in a certain industry determines the level of competition in a given business. When there is many competitors in a given industry offering similar products and services, a company's power to determine the terms of deals that will allow it to earn more money is greatly diminished. When there is a lot of competition in a market, it usually means that competitors are concentrating on each other's market share by aggressively pricing their items. This results in possible charges for all competitors in that industry. When competitors are about equal in size and power, the depth of competition is at its peak, and an increase in leads market to compete for market share, the enterprise is slow, or the enterprise's exit barriers are too high.

Potential of new entrants in the industry:

The potential for new entrants has a significant impact on the nature of industry competitiveness. The ease with which new enterprises can enter the industry is determined by entry barriers. Because there are numerous rivals in a market with few or no barriers to entry, the degree of competition will be high. Government policies, access to distribution channels, and entry expenses are all examples of entry barriers. Companies will be attracted to a sector with many barriers to entry because it has a greater competitive edge and the ability to demand higher prices and negotiate better conditions.

Power of Suppliers:

The number and concentration of suppliers in relation to industry players, as well as the degree of disparity in the input given, are the major focus of supplier power analysis. This section examines the amount to which a supplier may influence the input price, the cost of switching suppliers, the number of suppliers that dominate the sector, and so on. When the number of suppliers in a certain industry is small, their bargaining power increases, allowing them to pursue a superior trade advantage.

Power of Customers:

This section investigates the number of purchasers in the sector, their scope, and the costs of switching from one product to another. When a corporation has a lot of bargaining power, it tries to gain customer loyalty, which is usually the case when the consumer base is limited. When customers in an industry have a lot of bargaining power, they frequently influence the quality and price of goods and services against the company's interests.

Threat of Substitute Products:

Substitutes can be utilized to replace a company's products or services, posing a risk to the organization. Customers can choose not to buy the firm's products if close replacements are available, weakening the firm's power. When the risk of replacement merchandise is large and the buyer's switching charge is low, an alliance becomes considerably less advantageous. Strategists must pay attention to various businesses because these industries may undergo changes that will make them interesting replacements.

Matrix's introduction

Experts in the strategy formulation process employ matrix as a key analysis approach. It is extremely useful when trying to figure out what the optimal plan for a company is. There are three steps to developing a strategy:

The input stages:

- The matching stage
- The decision stage

EFE and CPM matrices are included in the input stage. The organization evaluates its surroundings (both internal and external) at this stage by gathering data that will aid them in the matching and decision-making stages.

External Factor Evaluation Matrix (EFE):

At this stage, the company analyzes external factors by collecting data, which will help them in the matching, and decision-making stages. External Factor Evaluation (EFE) Matrix is a strategy tool used to examine company's external environment and to identify the available opportunities and threats.(Jurevicius, n.d.).

Organizations can use the following steps for external evaluation.

- Make a list of all the important external elements. List opportunities first, then threats, using a combination of ratios and percentages.
- Each factor should be given a weight. The weight should be in the range of 0.0 to 1.0 each factor's relative importance to the company's success is represented by the weight distribution. Opportunities are normally placed higher than dangers in terms of weight; however, the situation is different when the variables that harm the organization are considerable. It is crucial to remember that the overall weight must be 1.0.
- Then, for each factor, assign a score between 1 and 4. Each level denotes the degree to which each component is compatible with the company's current strategy implementation. 1=Major weakness, 2=minor weakness, 3=minor strength, 4= major strength are all possible interpretations of the rating score.
- To get their weighted score, multiply each factor's weight by its rating.
- To calculate the overall weights for the organization, add the weighted scores together.

Regardless of how many external elements are included in this matrix, the greatest weighted score must be 4.0 and the lowest must be 1.0. A score of 4.0 indicates that the company is effectively responding to its external environment by seizing opportunities and reducing dangers. When the score is 1.0, however, the situation is reversed.

Competitive Profile Matrix (CPM):

Organizations utilize a competitive profile matrix to assess their relative advantages and weaknesses in comparison to competitors. It is a regularly utilized tool in strategy formulation since it can assist a firm in identifying its main industry competitors by utilizing key success characteristics. The important areas on which an organization should focus to succeed in its industry are referred to as critical success factors. Weights range from 0.0 (low relevance) to 1.0 (great importance) while generating the competition profile matrix. These factors should be ranked on a scale of 1 to 4 after the weights have been assigned. Then multiply the weight by the rank to get each weighted score.

External Factor Evaluation Matrix:

Table 1

EFE matrix for ExxonMobil			
Opportunities	Weight	Rating	Weighted scores
The rise in the information about the use of energy	0.12	3	0.36
Growth in the value of energy	0.13	2	0.26
Increase in the tendency of individuals to spend	0.06	2	0.12
The rise in the mobility of labor capital and technology	0.08	2	0.16
Request for the change in renewable energy	0.05	3	0.15
Threats			
Regulations restricted undue emission of co2	0.08	4	0.32
Depletion of natural energy resources	0.12	3	0.36
Competition in the industry	0.09	1	0.09

The credit crisis and volatile raw material prices in	0.10	1	0.10
The hurricane effect on us gulf coast region	0.07	1	0.07
Disruption in gas supply	0.10	1	0.10
Total EFE score	1.00		2.09

Source: Authors' own calculation, 2022

COMPETITIVE PROFIT MATRIX (CPM)

ExxonMobil has the best market share, product quality, and production capacity, whereas BP has the best management, according to the table. ExxonMobil has the greatest weighted score of 3.48, followed by Shell with a weighted score of 3.10, and BP with a weighted score of 2.92.

Table 2.

ExxonMobil competitive profile matrix							
Critical success factor	Weight	Rating	Weighted score	Rating	Weighted score	Rating	Weighted score
Advertising	0.20	3	0.60	3	0.60	3	0.60
Product quality	0.10	4	0.40	3	0.30	2	0.20
Management	0.07	3	0.21	3	0.21	4	0.28
Financial position	0.10	3	0.30	2	0.20	3	0.30
Customer loyalty	0.05	4	0.20	3	0.15	2	0.10
Global expansion	0.20	4	0.80	4	0.80	3	0.60
Market share	0.09	4	0.36	3	0.27	3	0.27

Logistic	0.15	3	0.45	3	0.45	3	0.45
Production capacity	0.04	4	0.16	3	0.12	3	0.12
Totals	1.00		3.48		3.10		2.92

Source: Authors' own calculation, 2022

Internal analysis

Exxon Mobile is one of the world's leading oil and energy companies. But what makes them so successful? A comprehensive internal study can be beneficial in establishing what characteristics of this organization make it an industry leader to answer this issue. The company's resources and capabilities are two parts of this internal Exxon Mobile examination.

Resource Based View (RBV) Approach:

The firm's capabilities are derived from its resources. Organizational capabilities are created by combining resources. A company's resources are both tangible and intangible. Visible and quantifiable resources are assets that can be seen and measured. Intangible assets are assets that are typically deeply rooted in a company's history and have accumulated through time. Competitors have a hard time analyzing and replicating intangible assets.

Exxon Mobil has got a varied number of plants all over the world. This has been strategically placed all around the world to keep a grasp on the global market. Their locations make them favorable for lower cost in transportation which in turn is also a sustainable practice with de regard to that place. Potential reserves, according to ExxonMobil, are one of the key drivers of intrinsic value in an integrated oil and natural gas company's upstream operations over the long term. ExxonMobil's proven reserves were estimated to be at 15 billion oil-equivalent barrels at the end of 2020.

Exxon has been known to have one the highlighting R&D arenas that helps in technological advances and make less carbon footprint globally which is a persistent problem with many companies. How ExxonMobil does this is a continuous state of thorough successful exploration, acquisitions, divestments, and ongoing development planning and appraisal activities.

Exxon's success is largely due to its unique resources and capabilities, as well as how it uses them to generate long-term competitive advantage. ExxonMobil has a wide and diverse portfolio of undeveloped resources, which gives the company a lot of leeway in developing new supplies to meet future energy demand and replenish its proven reserves.

ExxonMobil has a wide portfolio of high-quality projects and prospects across their Upstream, Downstream, and Chemical sectors, as one of the world's largest publicly held international oil and gas corporations. ExxonMobil's strategies are carried out through global function businesses, which give the company a competitive advantage by ranking opportunities globally and deploying people and other resources in ever-changing economic conditions.

Key Internal Forces:

Analyzing key internal factors for an ExxonMobil contains factors as a management, organizing, motivating, staffing and controlling. Considering the strategic forces held by the company in most parts of the world is appreciable because of their responsible and sustainable. When I say sustainable practice, I will mention one of their most successful projects "the LNG project in Papua New Guinea" in

which “gas flows through a 400-mile pipeline down some very rugged terrain to the LNG plant, which is located on the coastal area, so it's at sea level. So, you move from 9,000 feet to sea level about 400 miles away”.

This venture's successful launch highlights their distinctive capabilities and resource development, particularly in difficult environments. And it's only possible because of their incredibly brilliant and committed employees and contractors. This is ExxonMobil and this is exactly what they do.

Management:

Planning:

Exxon Mobil's management style is based on three uncompromising goals: exceptional technology, rigorous standards and an unwavering commitment to best-practice safety procedures. When the Exxon Valdez, an oil ship owned by the Exxon Shipping Company, spilled 11 million gallons of crude oil into Alaska, it was a turning moment for FORECAST OPERATIONS AND STRATEGIES that guide their everyday work, which is called OIMS (Operations Integrity Management System). OIMS delivers a systematic, organized, and disciplined way to measuring progress and tracking accountability for safety, security, health, and environmental performance across business lines, facilities, and projects through a systematic, structured, and disciplined manner.

This aided the organization in establishing broad objectives for their management style. It is made up of 11 main aspects that assess and reduce risks to people, the environment, and the communities in which they operate. Assessing the risk associated in their operations — from offshore platforms to their offices — and making plans to minimize and manage that risk over the course of the operation is fundamental to OIMS.

Organizing:

Managers convey authority to job holders in this function." The organizational structure of Exxon Mobil is based on a collection of segments from units, sections, divisions, and departments that work together to achieve organizational goals. Exxon's management team consists of the chairman and chief executive officer, as well as four senior vice presidents, one of whom serves as the company's treasurer. There are eleven members of the board of directors, 10 of whom are "independent as defined by New York Stock Exchange criteria,"

"Nearly 80,000 people, of which around 37 percent were situated within the United States and 63 percent were located globally," according to the global workforce that makes up the organization's leadership and staff positions. More than 3,600 people, from various nations across the world, work together to form the management and professional group.

Motivating:

ExxonMobil launched the Core Strengths: Results through Relationships training to assist employees and managers get a better understanding of their own and their team members' motivations, improve communication, and better prevent and manage conflict within teams and among colleagues. With the help of Core Strengths' relationship intelligence, project teams were able to transform previously ineffective dialogues into interactions that resulted in increased innovation and efficiency.

“It really gets down to the internal core of what drives and motivates people, and that's really the complexity that I think that's hidden whenever we're trying to solve these big business challenges”

ExxonMobil has swiftly extended the program, certifying over 100 internal facilitators to present the Results through Relationships session to the company's global workforce. The support tools have been praised for their ease of use and flexibility to allow facilitators with varying levels of experience, from 6 months on the job to 20 years with ExxonMobil, to teach the course to a diverse employee base.

Staffing:

Exxon's human resource strategy is to expand the number of national personnel over the course of a project's life cycle and train them in the technical and professional skills required for working on current and future projects and operations. The approach applies to the functions of recruiting, selection, training, maintenance, and development of staff in human resources. As previously stated, the strategy's long-term goal is to hone the talents of talented employees who are deemed competent and highly equipped to fulfill worldwide expectations of the organization's future needs.

Controlling:

The System of Management Control Basic Standards at ExxonMobil establish the fundamental principles and concepts that guide their corporate controls. The Integrity Management System for Financial Controls is meant to identify and measure financial control risks, as well as methods for minimizing concerns, monitoring compliance with standards, and reporting results to ExxonMobil's appropriate operations and management groups. The Sarbanes-Oxley Act and NYSE listing standards are met or exceeded by these company-wide financial controls. An independent examination by PricewaterhouseCoopers LLP confirmed that their internal controls system is effective for financial reporting. Regular self-assessments and audits help verify that all operating units follow our controls and requirements consistently.

Marketing:

With the advent of newer big data analysis technology, Customer analysis has become one of the key factors in modern marketing. Population and income growth, as well as an unprecedented expansion of the global middle class, are predicted to drive increased demand for energy over the coming few decades, and this is where Exxon's **customer analysis** one cloud service aims to collect the critical data, they need to expand this industry. ExxonMobil is responding to the increased demand for its products by providing solutions that help customers cut emissions and enhance energy efficiency.

Exxon Mobil's core businesses include crude oil and natural gas exploration and production, as well as the manufacture, trade, transportation, and sale of crude oil, natural gas, petroleum products, petrochemicals, and a wide range of specialty products. It also makes a variety of petrochemical products, which are utilized as raw materials in a variety of industries.

The company's business operations are separated into three primary segments: upstream, downstream, and chemical.

Exxon Mobil's **upstream** business is divided into five divisions. Unconventional, Deep-water, heavy oil liquefied natural gas (LNG), and conventional. The upstream global value chain of Exxon Mobil encompasses exploration, development, production, and marketing.

Exxon Mobil's **downstream** sector mostly consists of fuels and lubricants. The company is one of the largest producers and marketers of fuels and lubricants in the world.

Petroleum products are sold at a rate of over 5 million barrels per day. Its entire fuel value chain includes crude procurement, manufacture, distribution, and retail, commercial, and supply-chain sales of gasoline products.

The firm is one of the world's largest refiners, with 21 refineries and a distillation capacity of almost 5 million barrels per day. The development, production, and marketing of base stocks and finished lubricant products are all part of Exxon Mobil's lubricants **value chain**.

Exxon Mobil is also among the top chemical makers in the world. It sells more than 25 million tons of chemicals each year. Exxon Mobil is either the world's number one or number two chemical producer for more than 80% of its chemical product portfolio.

Apart from basic chemicals such as olefins, aromatics, and glycols, the company also manufactures performance items for a variety of consumer uses such as food packaging and automobiles.

Consumer demographics, production costs, marketing, and distribution, as well as competition and demand, are all factors that influence product **pricing**. Before deciding on a pricing for a product, business executives analyze all these considerations.

Apart from production costs, additional elements that affect pricing strategies in the case of ExxonMobil include government policies, taxation, demand, competition, and several other considerations. As a result, petrochemical companies don't have a consistent pricing strategy. Exxon Mobil pricing their products based on these parameters as well. The corporation, on the other hand, sells a wide range of items that are priced differently depending on market dynamics, demand, and production costs.

In the petrochemical business, Exxon Mobil is a well-known brand with a large global presence. A strong brand image has also been successfully handled by the corporation. To maintain a solid social image and increase brand awareness, the brand works on several facets of marketing mix.

It engages in CSR in addition to sustainable business operations to preserve a positive social image. However, this is the digital marketing era, and the use of digital media for marketing and promotions has increased across industries, including the petrochemical industry.

Exxon Mobil, for example, uses digital channels such as a collection of company-owned websites, social media, and personalized internet advertising to increase brand awareness and sales around the world aligning with the shifting global thoughts about energy consumption.

Exxon Mobil is now aggressively embracing social media platforms such as Facebook and YouTube to increase brand recognition and engage customers.

Finance and Accounting:

The recording and analysis of company activities are referred to as accounting and finance. Understanding your incoming and outgoing cashflow will help you prevent failure by allowing you to make better decisions in the future.

As of 2020, ExxonMobil had total assets of 332.8 billion USD. ExxonMobil's total assets declined by around \$30 billion from 2019 to 2020.

The debt-to-equity ratio of ExxonMobil was 0.93 on 2020 which was the peak in recent years. Looking back, it's evident that it increased over the last two decades. Borrowing this extra capital could be a strategy to invest in their long-term goal which may have a potential big return in the upcoming years. The debt to asset ratio being 0.5 is still promising for the investors.

ExxonMobil's activity ratio wise, the inventory turnover ratio is 0.95.

ExxonMobil's financial report 2020 indicates, the Gross Profit Margin was 18.04% with Gross income being 321.45 billion USD. With an operating margin 4.18%, shows a substantial decline from past few years which indicates the impact of COVID-19 on the energy sector. The net profit margin was -12.59% in 2020.

ROA (return on total assets) of 4.07% and reported an EPS (earnings per share) of -5.25\$ for their 2020 fiscal year. And a net loss of 224.40 billion dollars in 2020, which the year before was a positive 143.40 billion dollars, again indicating the impact of COVID-19 on the company's business. But the company showed enormous resilience in that crisis which is reflected on their earlier and later accounts.

Production and Operation:

Its production model is an integrated oil and gas corporation that uses a disciplined approach and long-term planning to meet long-term global energy and petrochemical demand. The integrated value chain runs from resource discovery to commodities product commercialization. ExxonMobil has several divisions.

- Upstream:
 - Exploration is the process of discovering new oil and gas deposits.
 - Development: plans and constructs large-scale oil and gas extraction projects
 - Production: operates and oversees the oil and gas extraction

- Downstream: refines crude oil and natural gas into fuels and other goods.
- Chemicals: manufactures chemical products

To combine the capital-intensive industry with long-term wealth development, ExxonMobil employs disciplined investing, a well-balanced portfolio, and strong management processes. Regardless of market conditions, it invests methodically in Upstream, Downstream, and Chemicals to assure long-term wealth generation. ExxonMobil can capture value at cyclical times when other companies can't, thanks to its decades-long time horizon.

Diversification in each of the three business units makes up the balanced portfolio. For the past 21 years, it has successfully replaced the reserves it has depleted; without new resources, the corporation will not be able to sustain itself in the long run. It invests more than \$20 billion per year in new capital to facilitate the production of these resources. It maintains and upgrades midstream and downstream activities to convert raw materials into marketable products like gasoline, lubricants, polymers, and chemicals. It has a lot of equilibrium even inside the business units. Economies of scale and flexibility are enabled by the size, location, and kind of resources, projects, and assets.

ExxonMobil's robust operations, guided by a core business strategy, continually deliver value to the company and, ultimately, to its shareholders. It is a pioneer in finding and producing usable energy through rigorous management systems, disciplined investing, and a well-balanced portfolio. ExxonMobil

will continue to advocate goods that fulfill global energy needs, whether it's oil, gas, nuclear, solar, or a new energy source.

Research and Development

R&D has always been a part of ExxonMobil's DNA, dating back over 135 years. From the clean, efficient fuels that power today's transportation to the natural gas that gives light and heat to homes and businesses, their advances have helped deliver the energy essential to modern living. ExxonMobil has spent \$16.5 billion on research and development across all their business lines since 2000.

Our world now faces a dual challenge: satisfying rising energy demand while simultaneously lowering environmental impacts, including climate change threats. ExxonMobil has pledged to do its part.

Meeting the dual challenge is a worldwide problem that will require cooperation from governments, businesses, consumers, and other stakeholders. ExxonMobil has been a strong advocate for a price on CO2 emissions that applies to the entire economy.

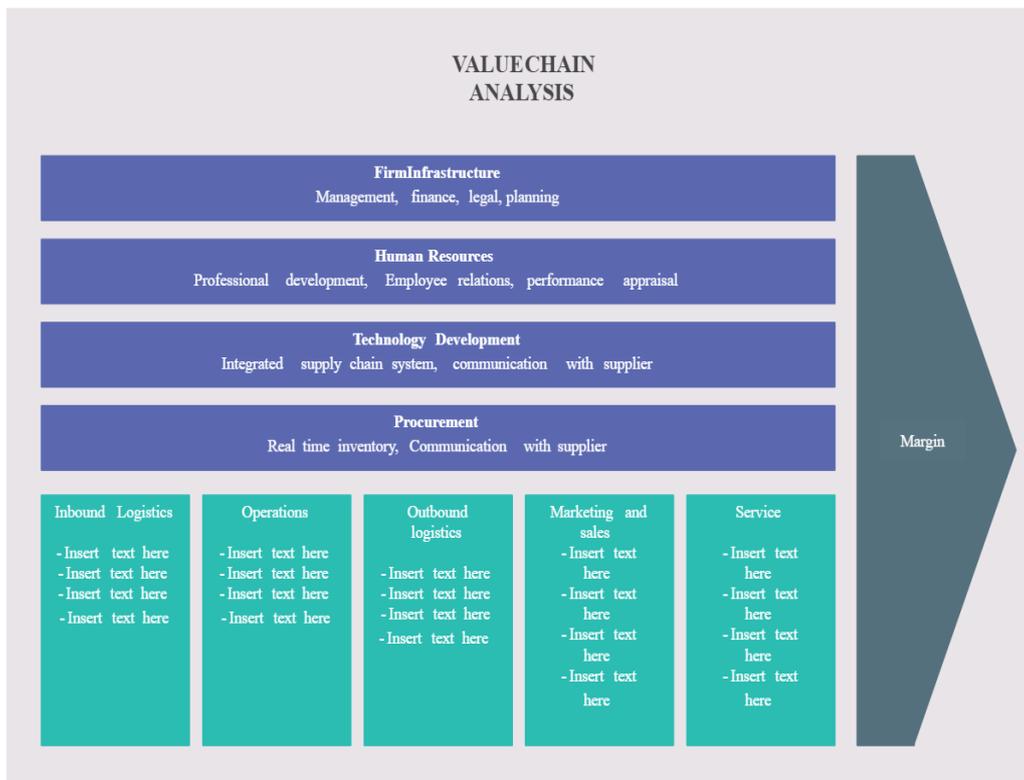
They joined the Oil and Gas Climate Project in 2018, a voluntary initiative that brings together more than a dozen of the world's largest oil and gas companies to work on solutions to alleviate climate change concerns. They are committed to the Paris Agreement as a critical framework for mitigating climate change concerns.

1- Management Information System:

ExxonMobil is committed to conducting business in a way that is compatible with the environmental and economic demands of the communities in which it operates, while also maintaining the safety, security, and health of its workers, those involved in operations, customers, and the public. These commitments are outlined in its policies on safety, security, health, the environment, and product safety. The Operations Integrity Management System, a disciplined management system, is used to put these policies into action (OIMS).

ExxonMobil's OIMS Framework creates a set of global expectations for dealing with the risks that come with our operations. ExxonMobil uses the term Operations Integrity (OI) to refer to all parts of its operations that may have an impact on personnel and process safety, security, health, or environmental performance.

Figure 1. Value Chain Analysis:



The value chain analysis is a framework that companies use to understand their cost position and to identify the many methods that could be utilized to make a business-level strategy easier to implement. The value chain of a company is divided into primary and support activities.

Primary Activities:

- **Supply Chain Management:**
 - A business-to-business approach that ensures a consistent number of sales.
 - Both direct and indirect methods are used for distribution.
 - Partnerships with local vehicle dealers, garages, fuel wholesalers, and other businesses that provide marketing and other services in areas where Exxon is not present.
- **Operations:** Around 40 producing oil and gas fields in the North Sea are owned by ExxonMobil. Shell U.K. Exploration and Production manages many of these fields as part of a joint venture. They are responsible for about 5% of the UK's oil and gas production.
- **Distribution:** Around 60% of the refinery's petroleum product output is exported, making it one of mainland Norway's top exporters.
- **Sales and Marketing:**
 - Exxon, Mobil, and Esso are three fuel brands that are distributed all over the world.
 - As a matter of necessity, more focus should be put on sustainable energy.
 - In the marketing of petroleum products, the corporation is the market leader.

Support Activities:

- **Product R&D, Technology and Systems development**
 - Advance motor technology
 - Hydrogen fuel cells
 - Carbon Capture and Storage
 - Controlled freeze zone
- **Human Resource Management:**

ExxonMobil's Human Resources mission is to use people to gain a competitive edge. HR plays a critical role in helping to design strategies and people-related initiatives, policies, and programs to guarantee our employees see ExxonMobil as an employer of choice, which helps to secure our company's long-term success.

- New intensive training to broaden their knowledge's depth and breadth
- Nearly 80,000 employees work for a corporation.

- **General Administration:**
 - Operation safety
 - Environmental performance
 - Workplace

- **Firm Infrastructure:** They are one of the most geographically well-balanced big oil firms, with roughly 40% of their refining capacity in North America, 30% in Europe, and the rest in Asia Pacific. This regional diversity allows them a lot of options when it comes to selling refined products to big markets.

Internal SWOT Analysis:

Strength:

- **A well-known brand with a solid reputation:** Exxon Mobil's massive scope of operations is one of its greatest assets. It is now engaged in exploratory activities on six continents worldwide. Because the corporation has been in the energy and petrochemical business for almost a century, it now has significant scale and scope in the space. In its peer group, it has the largest crude capacity and the most refineries. Exxon Mobil has been able to carve out a strong brand image for itself in the competitive energy and petrochemicals sector because of all these elements, providing a sense of stability to its stakeholders.
- **Diversified operations across geographies:** Exxon Mobil's large scope of varied operations across geographies is one of the company's primary assets. Although the United States is the company's primary source of revenue, non-US territories such as France, Belgium, Germany, Singapore, Japan, Italy, and many other countries also contribute significantly. The company's varied regional presence allows it to manage its global revenues in accordance with changing economic and political conditions across multiple locations, reducing risk in its operations. It also has operations in many non-OECD nations, which is a benefit because these countries are likely to see significant demand increase soon. Exxon has a competitive advantage because of its large scale of operations across geographies, which gives it more flexibility and capacity to increase revenues by utilizing its global presence.
- **Robust Research and Development:** Exxon Mobil has significant R&D skills thanks to its broad experience in the energy and petrochemicals industries. The company is concentrating on gaining a strong competitive edge by continuing to invest in R&D and exploring more efficient drilling and resource exploration techniques. The company searches for chances in new product development, improving existing products, and improving customer service by optimizing existing manufacturing and production capacities through a strong focus on R&D activities. As a result, Exxon has an advantage in positioning itself at the forefront of radical advances in the industry in which it works.
- **Vertically integrated operations:** Exxon has the expertise to focus on all parts of the value chain of the business rather than a single segmented operation like as refining or production because it is an integrated oil and gas firm. The organization can optimize the whole value chain to minimize costs and maximize process efficiency by exerting operational discretion and control in each and every step of the oil and gas process.
- **Strong dealer community:** It has created a culture among distributors and dealers in which dealers not only market the company's products but also spend in educating salespeople to explain to customers how they may get the most out of the products.
- **Strong Brand Portfolio:** Exxon Mobil has spent a lot of time and effort developing a strong brand portfolio. Exxon Mobil's SWOT analysis clearly emphasizes this viewpoint. If the company wants to branch out into new product categories, this brand portfolio might be highly valuable.
- **Mergers and acquisitions have a proven track record of successfully integrating complementary businesses:** In recent years, it has effectively integrated several technology businesses to streamline operations and develop a trustworthy supply chain.

Weaknesses:

- **Lawsuits and Contingencies:** Exxon's commercial practices have resulted in a slew of lawsuits and other legal actions involving environmental deterioration, which have resulted in damages, penalties, and fines. In January 2014, the corporation reached an agreement with the Louisiana Department of Environmental Quality for its facility in Louisiana, which included a \$300,000 fine and a \$1 million in on-site repair work. The firm was also required to execute \$1.029 million in positive environmental initiatives, as well as pay a stipulated penalty to address future environmental non-compliances, as part of the settlement. Such litigation, penalties, and losses incurred because of environmental deterioration would be detrimental to Exxon's excellent brand name among its stakeholders.
- **Health and Safety:** Exxon's employees are one of the company's most important stakeholders. Given the physically demanding and perilous nature of the job they are doing, it is the company's primary obligation to safeguard their health and safety. However, several safety incidents involving personnel have been reported across locations and sites, indicating that Exxon's employees' health and safety are still a concern. Failure to achieve these requirements could be costly to the firm in a variety of ways, the most serious of which being the employees' loss of faith in it.
- **Decline in Financial Performance:** Exxon reported it lost \$22.4 billion in 2020, its poorest year in four decades, compared to a profit of \$14.3 billion in 2019. The business lost \$19.3 billion in the last three months of the year as it wrote down the value of U.S. natural gas properties acquired when gas prices were much higher before tracking swamped the market a decade ago, accounting for a large portion of its losses. Because of the epidemic, Exxon curtailed its exploration and production spending by \$21.4 billion, or 35 percent, last year.
- **Declining Oil Reserves:** Exxon's diminishing oil reserves are one of the company's major problems. The problem is exacerbated by Exxon's low replacement rate for oil reserves. Its downstream industry contributes about 12% of revenues, which could be jeopardized due to the issue of dwindling oil reserves. Exxon must secure the availability of appropriate reserves to supply the requisite demand in the natural gas industry, where reserves depletion occurs at a considerably faster rate than in the oil industry. Exxon's margins are further squeezed by low prices caused by many companies in the natural gas business.
- **Need more investment in new technologies:** Exxon Mobil needs to invest more in technology to integrate operations across the board, given the magnitude of its expansion and the various geographies it plans to enter. Currently, technology investment is not keeping pace with the company's objectives.
- **Integration of enterprises with distinct work cultures has not been very successful:** Exxon Mobil, despite its success in integrating small businesses, has had several failures when it comes to merging businesses with distinct work cultures.
- **Financial planning is not really done correctly or efficiently enough:** The current asset ratio and liquid asset ratios indicate that the corporation can make better use of its cash than it is now.

Internal Factor Evaluation Matrix (IFE Matrix):

Table 3.

Key Internal Factors	Weight	Rating	Wtd. Score
STRENGTHS			
In the oil industry, they have a dominant market position and a strong brand reputation.	0.10	4	0.40
Operational diversification across geographies	0.07	3	0.21
Robust research & development capabilities	0.09	4	0.36
Vertically integrated operations	0.06	4	0.24
Strong dealer community	0.05	3	0.15

Strong Brand Portfolio	0.08	4	0.32
Mergers and acquisitions have a proven track record of successfully integrating complementary businesses	0.05	3	0.15

Source: Own Calculation.2022

Table 4.

WEAKNESSES			
Lawsuits & Litigations	0.8	1	0.8
Declining financial performance	0.09	2	0.18
Decline in Oil reserves	0.10	1	0.10
Health & safety issues of employees	0.07	2	0.14
Need more investment in new technologies	0.08	2	0.16
Integration of enterprises with distinct work cultures has not been very successful	0.05	1	0.05
Financial planning is not really done correctly or efficiently enough	0.05	2	0.10
Total	1.00	37	3.36

Source: Authors' own calculation, 2022

IE Matrix:

ExxonMobil has above-average internal strengths in the internal factors matrix. The company's strengths dominate its weaknesses, as evidenced by the SWOT analysis. ExxonMobil, on the other hand, does not adapt well to external factors, as evidenced by its positions on environmental issues, social responsibility, and diversity. Their response to external challenges is average. As a conclusion, ExxonMobil should focus on maintaining its internal strengths while improving its outward reaction.

Table 5.

EFE total weight	IFE total weight			
		Strong (3.0-4.0)	Average (2.0-2.99)	Weak (1.0-1.99)
	High (3.0-4.0)	Grow	And	Build
	Medium (2.0-2.99)	hold	And	Maintain
	Low (1.0-1.99)	Harvest	And	divest

Source: Authors' own calculation, 2022

EFE Score: 2.09 = Medium

IFE Score: 3.36 = Strong

According to above scores ExxonMobil should follow Hold Strategy.

Alternatives to Action:

Hold current strategies

Pros	Cons

<ul style="list-style-type: none"> • Already at the top of the competition • Industry expertise • Large asset base • Have a significant market share 	<ul style="list-style-type: none"> • Poor public relations and lack of diversity. • It would have been more efficient. • They have recorded low asset returns. • If they do not address environmental challenges, they may lose this.
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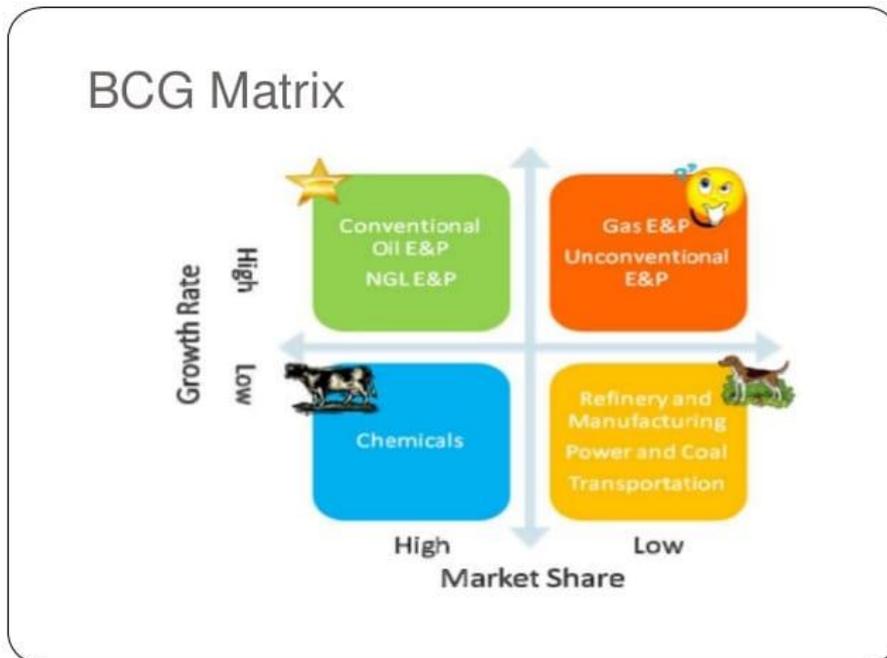
Accept external pressure and make necessary changes

Pros	Cons
<ul style="list-style-type: none"> • Produce environmentally friendly goods. • Increase your client base by becoming more socially conscious. • Improve relations with clients, public officials, and other stakeholders. • Increase revenue through improving efficiency. 	<ul style="list-style-type: none"> • It's likely that they'll have to change their manufacturing procedures. • More research and development on how to do this without jeopardizing their asset base is needed. • It takes a long time to rehabilitate a tarnished reputation.

BCG Matrix:

The Boston Consulting Group Matrix (BCG Matrix), also referred to as the product portfolio matrix, is a business planning tool used to evaluate the strategic position of a firm's brand portfolio. The BCG Matrix is one of the most popular portfolio analysis methods. It classifies a firm's product and/or services into a two-by-two matrix. Each quadrant is classified as low or high performance, depending on the relative market share and market growth rate. (BCG Matrix - Overview, Four Quadrants and Diagram, n.d.)

Figure 2.



BCG-Star (Exploration and production (E&P) business):

- It is the most profitable company category and produces a lot of cash.
- It also uses a huge amount of cash. More specifically, conventional oil exploration and production has been a "star," while its growth rate has slowed in comparison to natural gas.

BCG - Cash cow - (Chemical operation)

- ExxonMobil's Chemical division has been a "cash cow" for the company, delivering a high profit margin with a comparatively little investment.
- The chemical industry has been expanding at a steady rate.

BCG - Dog (Refinery and manufacturing business):

- The refinery and manufacturing industry is, at its core, a low-margin company. When you consider the poor growth rate, this section is a "dog." The coal mining and oil transportation industries are not as appealing as the rest of the industry.

BCG - Question Mark (E&P):

- E&P (for example, shale oil and gas E&P) is capital-intensive and time-consuming, with several technological hazards.
- Due to reduced natural gas prices, gas exploration and production is not profitable as oil exploration and production.
- In the coming decades, advances in E&P technology will make unconventional oil and gas production more economical, but it is currently not cost effective.
- Non-conventional E&P and gas E&P are therefore characterized as "question marks."

SPACE Matrix:

Figure 3.

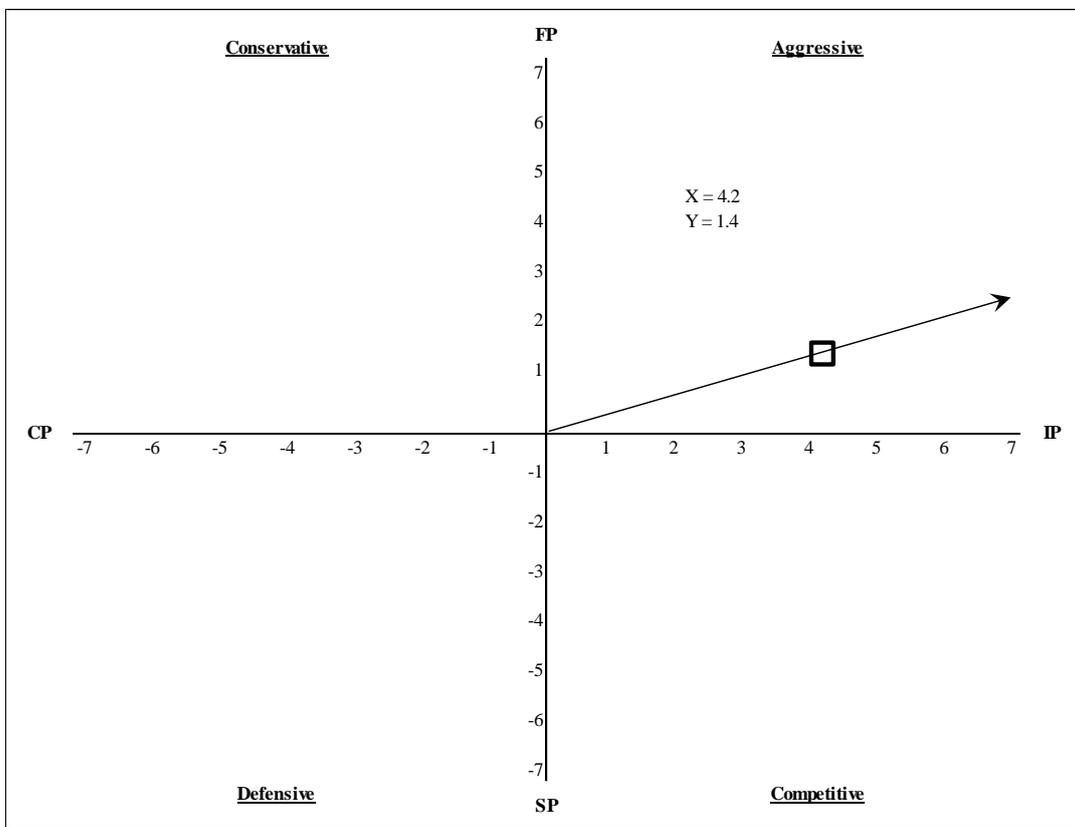


Figure 4.

<i>Internal Analysis:</i>		<i>External Analysis:</i>	
Competitive Position (CP)		Industry Position (IP)	
Market Share	-1	Growth Potential	7
Access to Oil Fields	-1	Financial Stability	7
Number of Tankers	-1	Ease of Entry into Market	3
Technological know-how	-1	Government Regulations	3
Control over Suppliers and Distributors	-1	Profit Potential	6
Competitive Position (CP) Average	-1.0	Industry Position (IP) Average	5.2

Figure 5.

<i>Internal Analysis:</i>		<i>External Analysis:</i>	
Financial Position (FP)		Stability Position (SP)	
ROA	6	OPEC Issues	-5
Quick Ratio	3	Technological Changes	-4
Net Income	7	Governmental Regulations	-6
Revenues	7	Competitive Pressure	-7
Company Worth	7	Dependence on Oil	-1
Financial Position (FP) Average	6.0	Stability Position (SP) Average	-4.6

Exxon is clearly in the Aggressive Quadrant, but this is largely due to its upstream operations. Chemical and downstream components are not nearly as efficient or powerful. Exxon scored a perfect -1 for CP when all criteria were considered.

Strategies for Long term Objectives using TOWS Analysis:

A TOWS analysis is a variant of SWOT analysis that translates for Threats, Opportunities, Weaknesses, and Strengths.

It is a valuable method for identifying ExxonMobil's existing market environment's Threats (T), Opportunities (O), Weaknesses (W) and Strengths (S).

Exxon Mobil is one of the industry's top companies, and it needs to keep it that way. Exxon Mobil is doing a thorough evaluation of its TOWS analysis to make strategic conclusions. A TOWS analysis of the organization requires an active approach including coordination among all the company's divisions, including finance, marketing, management, human resource, logistics, strategic planning, management information systems, and so on.

ExxonMobil, like its opponents, has several aspects to consider when developing or modifying its short- and long-term strategies, including a significant focus on environmental problems. If ExxonMobil wants to develop a stable business strategy and maintain its brand reputation among the increased competition in its industry, it must handle evolving energy requirements and increased corporate responsibility.

The Threats and Opportunities are external strategic factors, and the Strengths and Weaknesses are considered as internal strategic factors which we can identify using TOWS Analysis.

It results in a 2X2 matrix, which we call as TOWS Matrix.

The long-term objectives of ExxonMobil are mentioned in TOWS matrix below:

Table 6. TOWS Matrix:

	Threats:	Opportunities:
	<ol style="list-style-type: none"> 1) Environmental rules are in place. 2) Competition within country is expanding. 3) The currency has been depreciated. 	<ol style="list-style-type: none"> 1) Global LNG demand is on the rise. 2) The number of people using social media is growing all around the world.

	<ol style="list-style-type: none"> 4) There are increasingly more replacement products accessible. 5) In recent years, the cost of fuel has increased, making inputs more costly. 6) Challenging Environment in the downstream market 7) Entry barriers posing a danger to the market. 	<ol style="list-style-type: none"> 3) Ecologically responsible products and services are becoming more popular. The government is providing subsidies on these. 4) The number of people using the internet is growing all around the world. With the rise in internet usage, e-commerce is also on the rise. 5) Worldwide energy consumption is increasing so the demand is also increasing. 6) Consumer expenditure is rising in tandem with household expenditure. Inflation is predicted to remain low throughout the economy. 7) Interest rates are low, which makes major enterprises an attractive proposition.
<p>Strengths:</p> <ol style="list-style-type: none"> 1) Geographically diverse revenue stream. 2) A significant social media influence. 3) Low-cost system which gives it an edge over the competition. 4) An extremely competent, creative, and diverse labor force. 5) In recent years, the company has generated benefits and opportunities, indicating a good financial condition. 6) High number of outlets and wide distribution network. 7) A stable asset foundation. 	<p>ST:</p> <ul style="list-style-type: none"> • To reach new customers and combat new entries into the industry, establish a comprehensive distribution network. (S6, T7) • Invest in intellectual property rights using the firm's strong financial position. This would make it easier to participate in a market that is becoming increasingly competitive. (S7,T2) • Use its creative teams to come up with less expensive energy alternatives that can be used to save cost. (S4, T5). 	<p>SO:</p> <ul style="list-style-type: none"> • Increase the brand awareness in order to entice customers to spend money. (S5, S6,06) • Make use of its social media presence for promotion and to drive traffic to its website. (S2,O3) • Focus on lowering cost and develop eco-friendly items through innovation in order to sell them cheaply. (S3,S4,O3,O5) • Discounts are used to advertise at affordable rate. Due to low inflation and costs, this would assist improve sales and profits. (S3,06)

Weaknesses:	WT:	WO:
<ol style="list-style-type: none"> 1) In comparison to the competitors, the company spends less on research and innovation. 2) Financial performance is deteriorating. 3) It has a high staff turnover rate, as well as low employee motivation and satisfaction. 4) Exxon Mobil leases a large amount of its property, which necessitates the payment of rental fees. 	<ul style="list-style-type: none"> • Exxon Mobil should increase its research and development investment to keep up with the competition (W1, T2). • To keep talent, offer incentives, enhance learning, or create a better working atmosphere. This will keep staff from switching sides to competition. (W3,T2) 	<ul style="list-style-type: none"> • To stimulate the growth of owned vs rented property, low-interest financing can be used to facilitate property ownership. (W4,O7) • Offer incentive and compensation packages and Increase payrolls to prevent turnover and boost employee morale and satisfaction. (W3,O6)

Source: Own Analysis, 2022

SWOT Analysis of Exxon Mobil:

Table 7: SWOT Analysis

Internal	<p>STRENGTHS</p> <ul style="list-style-type: none"> ➤ Leading market position. ➤ Approximately 75000 employees worldwide. ➤ Largest exploration and production (upstream) company. 	<p>WEAKNESSES</p> <ul style="list-style-type: none"> ➤ Cost of environmental hazards ➤ Pending Litigations. ➤ Declining oil reserves and production.
External	<p>OPPORTUNITIES</p> <ul style="list-style-type: none"> ➤ Increasing demand for refined products in China. ➤ Increasing demand for liquefied natural gas (LNG). ➤ Capital Investment. 	<p>THREATS</p> <ul style="list-style-type: none"> ➤ Economic slowdown in the US and the European Union. ➤ Risks associated with conducting business outside US. ➤ Environmental Regulations.

Source: Own Analysis, 2022

Figure 6. TOWS Matrix:

IFE Matrix	<u>Threats</u>	<u>Opportunities</u>
	<ul style="list-style-type: none"> • Economic slowdown in the US and the European Union • Risks associated with conducting business outside the US • Environmental regulations 	<ul style="list-style-type: none"> • Increasing demand for refined products in China • Increasing demand for liquefied natural gas (LNG) • Capital investments
CPM Matrix	<u>Weaknesses</u>	<u>Strengths</u>
	<ul style="list-style-type: none"> • Legal proceedings • Pending Litigations • Employee unrest • Continued weak upstream performance in the US 	<ul style="list-style-type: none"> • Leading market position • Improvement in Financial Performance • Extensive Research & Development Activities • Geographical Diversification

Table 8: QSPM Matrix

QSPM MATRIX OF EXXONMOBIL							
SERIAL NO	EXTERNAL STRATEGIC FACTORS	ALTRNATIVE 1			ALTERNATIVE 2		
		Exploration in Canada			Exploration in Singapore		
		WEIGHT	RATING	WEIGHTED SCORE	WEIGHT	RATING	WEIGHTED SCORE
	Strengths						
1	Strong market position & Big brand name	0.15	4	0.60	0.12	3	0.36
2	Diverse operations in chemicals, coal, powr generation	0.13	3	0.39	0.19	3	0.57

3	Talented work force	0.11	4	0.44	0.13	2	0.26
4	Excellent global research	0.12	3	0.36	0.11	2	0.22
	Weaknesses						
1	Legal issues	0.17	3	0.51	0.15	3	0.45
2	Employee management	0.11	1	0.11	0.10	3	0.30
3	Oil spill controversies	0.12	2	0.24	0.12	4	0.36
4	Fraudulent investments and bribery cases	0.09	1	0.09	0.08	2	0.16
	TOTAL	100%			100%		
	Opportunities						
1	Increasing fuel/oil prices	0.12	4	0.48	0.14	3	0.42
2	Increasing natural gas	0.19	3	0.57	0.13	3	0.39
3	More oil well discoveries	0.13	2	0.26	0.11	2	0.22
4	Increasing demand for gas and refined products	0.11	3	0.33	0.12	2	0.24
	Threats						

1	Government regulations	0.15	3	0.45	0.17	3	0.51
2	Pollution guidelines	0.10	1	0.10	0.11	2	0.22
3	High labor cost	0.12	4	0.48	0.12	3	0.36
4	Hybrid cars not using Fuel	0.08	2	0.16	0.10	2	0.20
	TOTAL	100%		2.83	100%		2.56
	GRAND TOTAL			5.48	>		5.24

Alternative 1: Exploration in North America

Alternative2: Exploration in Asia
Attractiveness Score:

- 1 = not acceptable.
- 2 = possibly acceptable.
- 3 = probably acceptable.
- 4 = most acceptable.
- 0 = not relevant)

Conclusion and recommendation

Despite recent economic difficulties, worldwide energy demand is expected to rise by nearly 35% between 2005 and 2030. Developing countries will account for nearly all of the increase in energy consumption, with demand rising by more than 70%. Natural gas will be the fastest-growing major energy source, showing increasing demand for clean-burning fuels to satisfy rising power generation demands. Natural gas will overtake coal as the world's second most important energy source by 2030. Despite the enormous scope of the world's energy needs, ExxonMobil must continue to find new ways to meet not only today's but also future demands while minimizing the impact of energy on the environment. The continuous development of new energy technology to increase the availability of old fuels, produce new energy sources, and allow us to use energy more efficiently is vital to meeting the world's energy needs. ExxonMobil has stated that it will continue to innovate and develop many of these innovative technologies. While meeting the world's energy demands will necessitate ongoing innovation,

it will also necessitate tremendous investment. ExxonMobil's financial strength allows it to invest for the long term, regardless of economic conditions from year to year. In 2010, they spent a record \$32.2 billion on capital and exploration. They will continue to invest significantly – more than \$165 billion over the next five years – in new technology and projects to provide energy to the world efficiently. They are fully aware that developing and supplying energy implies risks, such as safety and environmental concerns, as well as financial, geopolitical, and technological risks. ExxonMobil will continue to refine and perfect its risk assessment and management strategy.

- Consumers and the general public rely on ExxonMobil to supply safe, affordable energy that allows them to live better lives while reducing risks to people, communities, and the environment.
- Appropriate slot should continue the current process while progressing in terms of paying attention, such as,
- Identify and pursue any attractive perforations possibilities, including as R&D, government ownership of 90% of oil reserves, and upstream operations in more than 40 countries.
- Capital spending should be focused on maximizing profitability. 1) Requirements for future product quality 2) Minimize Negative Effects on the Environment 3) Safety Devices 4) Reduced Operating Costs 5) Create products with a higher perceived value. 6) Less Expensive Raw Materials.
- Maintain best-in-class operations in all areas, such as global supply chain integration and strategic alliances.
- ExxonMobil is known for providing high-quality, value-added goods and services to its customers.
- ExxonMobil's alternatives and tactics have had to be improved on a regular basis.

Summary

These discoveries make ExxonMobil a priority. It assesses the company's market function by looking at its products, competitors, internal and external environments in order to produce practical technology at the commercial enterprise and department level. It also introduces the company's records and history while establishing the main theme. Technical literature review covers all relevant themes for the mentioned topics, such as tasks and vision statements, resource-based perspectives, internal audits, cost chains, pestle analysis, porter 5 force analysis, and technologies that can be explored by certain types of businesses. The technical and structural sectors encompass the various ranges of the method formula system as well as the most commonly utilized substrates. These elements are described in the elements to ensure that they comprehend the significance of the method process. IFE, EFE, CPM, SWOT, BCG, GS, and QSPM are the matrices discussed. The consequence and conversation portion makes use of the matrix added in the strategy and material section to create a variety of possibilities for the organization. Two good strategies were chosen, with the QSPM matrix being used to decide which was the most enjoyable. The elemental analysis of the selected technology is then performed in the conclusion and recommendation stage of this case study. The case's investigative findings strongly suggest that ExxonMobil has fared well in the oil industry and that the company needs to diversify its technology in order to develop. They recognize that continued growth and power transfer will bring with it security, environmental, economic, geopolitical, and technological dangers. ExxonMobil will continue to develop and improve its risk identification and management strategy. ExxonMobil is trusted by consumers and the general public to offer reliable, low-cost energy so that they can live better lives while minimizing harm to people, communities, and the environment.

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This bachelor's degree Business Administration and Management has been a genuinely life-changing experience for me, and I would not have been able to complete it without the help and direction of so many individuals.

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I'd really like to dedicate this thesis to my father, who always believed in my capacity to succeed academically. You're no longer with us, but your faith in me has allowed me to make this journey possible.

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The evolution of sustainability model patterns among winning participants of the Horizon Europe EIC Accelerator funding program

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Abstract

How many of the recently emerged and described sustainability models bring success to companies in the practice on the European level? In this study, prior winning participants of the Horizon Europe funding framework's EIC Accelerator program were analyzed regarding their extent of implementing various sustainability models described in the widely established 40 Circular Economy Business Model Patterns sustainable model categorization framework proposed by the BMI Institute to understand the relevance and applicability of sustainability models in practice in the European Union. During the study, a list of 391 former EIC Accelerator winning companies was retrieved from the EIC Accelerator Data Hub from the years of 2020 and 2021, which were manually analyzed and categorized into 13 distinct thematic categories based on the official Horizon Europe topic keywords. Among these, 31 startups falling into the Earth/Environmental Sciences category were individually analyzed to understand their applied business models and product functions to forecast their extent of including the 40 sustainability model patterns. Results showed that among the 40 patterns, 3 sustainability models, namely the 'Produce on Demand', 'Eco Lock-in', and 'Eco-Efficiency' were identified to have the highest level of implementation among the 31 winning thematic companies. Interestingly, insignificant difference was observed for the appearance rate of other sustainability models among all winning participants and the selected group of those participants which already deployed the most frequently used 'Produce on Demand' model. Finally, the trends of model emergence and decline were analyzed for the 40 models over the 2020 and 2021 period among the winning participants, where significant changes were observed in the appearance of novel sustainability models, with 'Servitisation' and 'Smart Assets' being the most dominantly emerging patterns, and 'Eco-Efficiency' and 'Communicate Responsibility' being the most declining patterns in 2021. The conclusion of initial results assume only a distant relationship between how the combination of various sustainability models would influence each other, suggesting that the implementation of different sustainability models is rather impacted by other factors, e.g. the company's technology and the implemented business model rather than the direct presence of other sustainability models. Furthermore, results also suggest the increase of complexity in the applied sustainability models over the years, likely driven by societal trends and the evolution of business model design.

Keywords: sustainability, sustainable development, sustainability models, technology funding, Horizon Europe, EIC Accelerator

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Introduction

Integrating sustainability and circular economy approaches into the business plan of companies has been at the forefront of business model innovation practices for the past years given their tremendous contribution to process optimization (Mukherjee, Sengupta & Sikdar, 2015), cost efficiency (Girotra & Netessine, 2013), customer appeal (Kumar & Christodoulopoulou, 2014), and indirect socio-environmental impact creation, among other advantages (Reddy, Sadasivam & Adams, 2014). Because sustainability is a recently emerging topic that is still dynamically changing (Geissdoerfer, Savaget, Bocken & Hultink, 2017), during the past years, a plethora of sustainability models have been identified along with several theoretical frameworks that have been established to holistically structure sustainability models, categorize them based on various factors, and identify their connection to a company's competitiveness. Such notable frameworks include the 40 Circular Economy Business Model Patterns (Takacs, Frankenberger & Stechow, 2020) by the BMI Institute ("Circular Economy — Business Model Innovation Lab", 2022), the 30 Questions to Kickstart Your Circular Business by Innovate UK's network partner, the Knowledge Transfer Network ("30 Ideas to Kickstart your Circular Business – Innovation Canvas", 2022), and the CIRCit Circular Economy Business Model Configurator (P. P. Pieroni, C. McAloone & C. A. Pigosso, 2019) ("Expert System Circular Economy Business Model Configurator", 2022), among others. However, there is no clear understanding on which models are the most impactful and relevant in real life settings for companies in terms of the successful implementation of projects (Silvius & Schipper, 2022) or the development of innovations (Adams, Jeanrenaud, Bessant, Denyer & Overy, 2015).

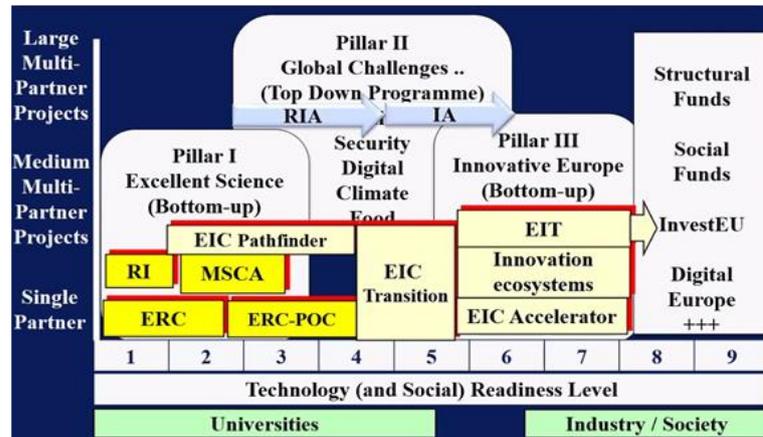
Previous research shows that there are different sustainability models which are more relevant in certain application domains, however their connection to the company's competitiveness and the achievable success in relation to their integration to the company's best business practices is unclear (Nosratabadi et al., 2019). Therefore, the aim of this study was to understand whether there are various sustainability models which are especially relevant to a wider range of companies regardless of sector in terms of bringing performance improvement and ensuring a more robust impact creation potential which improves the company's competitiveness. Moreover, whether there is any clear trend among these models in terms of their adoption, emergence, or decline, that would indicate specific changes in sustainability models, implying their evolution, or becoming more impactful and applicable to innovative companies.

Connecting sustainability models to exponential impact creation: the Horizon Europe EIC Accelerator funding program

Considering the extent of innovative business and sustainability model adoption, various studies have indicated the inclusive and agile business strategy development of young, innovative firms (Pellegrino & Piva, 2019) (Souto, 2015) (Roberts, Murray & Kim, 2022). Concerning the application of the most recently emerging sustainability models, early-stage innovative companies can thereby serve as a relevant study group that can allow the observation of the dynamics in emergence or decline in the adoption of the most recent sustainability model patterns in business model design in practice.

Among the various funding frameworks available in the European Union, the Horizon Europe technology funding framework is the most recognized that provides funding to support the emergence and market launch of the most innovative, exponential technologies across the different member states of the European Union (González Fernández, Kubus & Mascareñas Pérez-Iñigo, 2019). The Horizon Europe funding framework includes a variety of funding programs clustered into three main program pillars covering the support of early-stage innovations from the concept level to their prototyping stage and eventual market launch, based on the internationally recognized technology readiness level scale (see Figure 1 below).

Figure 1. Structure of the Horizon Europe technology funding framework. Technology funding programs under Pillar I, Pillar II, and Pillar III were primarily designed to provide support for innovations with technology readiness level 1-3 (ideation to proof-of-concept), 4-6 (prototyping), and 6-8 (validation and pre-commercialization), respectively.



Being the key and thereby most popular founding framework for facilitating breakthrough R&D activities across the EU (European Commission, Directorate-General for Research and Innovation, 2016), the various funding programs under both the current Horizon Europe funding framework and its predecessor Horizon 2020 framework are characterized by a particularly low success rate (European Commission, Directorate-General for Research and Innovation, 2018) due to the strict criteria and evaluation system for applicants to apply robust models to prove their future large-scale, distributed impact creation potential to the European Union. Therefore, participant early-stage companies are characteristically keen to apply the latest business and sustainability models to diversify their proposal to not only demonstrate their technical excellence but also showcase a solid impact creation potential to the European Union (De Marco, Martelli & Di Minin, 2020) (Veugelers et al., 2015). Therefore, this study was designed with a focus on understanding how participant companies apply the different sustainability models in their business model design practices, being the early indicators of the emergence of the latest sustainability models and the early decline of less relevant, older sustainability models.

Methodology

During the first step of establishing the structure of the research project, a variety of sustainability model categorization frameworks were analyzed in terms of their clarity and applicability for practical innovation cases. For this, an initial extensive literature search was conducted through search engines (Google) and scientific publication engines (e.g. Google Scholar, ScienceDirect) to identify publications and whitepapers that elaborate on different sustainable model categorization approaches to understand their extent of applicability to the potential technologies of applicants from the Horizon Europe funding framework. Relevant keywords during the literature search included “sustainable models”, “sustainable model patterns”, “sustainability design”, “circular economy model design”, “sustainability design toolkit”, “sustainability strategy”, and “sustainability blueprint”.

The most notable identified sustainable model categorization frameworks included the 40 Circular Economy Business Model Patterns by the BMI Institute, the 30 Questions to Kickstart Your Circular Business by Innovate UK’s network partner, the Knowledge Transfer Network, and the CIRCit Circular Economy Business Model Configurator. Upon further analyzing the structure of the proposed model categorization systems, the 30 Questions to Kickstart Your Circular Business was identified to provide an approach to incorporating sustainable models into the business plan of companies through

proposing open-ended questions about the potential applicability of various sustainability patterns to stimulate business development managers to redesign their company's current strategy, but without precisely defined use cases or definitions. Therefore, such categorization system was eventually excluded from the study. On the other side, the CIRCit Circular Economy Business Model Configurator system was identified to be too specific for the study, only focusing on subsegments or more narrowly defined areas of sustainability, such as involving rather model integration aspects of specific supply chain-related circular economy model practices, therefore this system was eventually excluded from the study, as well.

Therefore, at the end, the 40 Circular Economy Business Model Patterns categorization framework from the BMI Institute was identified to be the most applicable to the current study due to its holistic approach in listing a well-defined portfolio of current sustainability models that allows for a clear, step-by-step assessment of each model's presence in case of the identified innovations of the selected applicants.

Selection of the eventual source of innovative companies under the Horizon Europe funding framework

Secondly, after identifying the appropriate sustainable model categorization framework to retrieve the latest and most relevant sustainable models to be compared with the practices of innovative companies, the eventual source of innovative companies was identified. As the provided technology funding programs under the various Horizon Europe pillars are tailored for early-stage innovative companies with different stages of technological maturity, the level of sustainability model adoption of these companies differs based on the readiness of their technology and associated business strategy. As the likelihood of innovative companies including sustainability model design practices among the prioritized activities at the specific readiness levels is highly different, each program under the Horizon Europe framework was analyzed to understand its potential to be a source of relevant applicants to the study.

Programs under Pillar I and Pillar II are focused on providing financial support to innovative companies at their earliest technological development stages where sustainable model integration in the business model design practices is underrepresented due to the presence of a vague business and commercialization plan, given the concept or proof-of-concept level of the developed technology. On the other side, programs tailored at early-stage companies that have already reached technology readiness level 9 (such as structural funds and social funds) are comprised of applicants which are already on the market with a mature business strategy and therefore likely have lower willingness or need to change, as their models are proven, so their likelihood to necessarily involve the latest sustainability models in their practices is lower. Therefore, during this study, the focus was narrowed further to early-stage companies under the Pillar III Innovative Europe technology funding program group.

Within the Innovative Europe technology funding program group, 3 notable funding program schemes were identified, namely the EIT-related calls, the Innovation Ecosystems calls, and the EIC Accelerator calls. Considering that the EIT-related calls are operated semi-externally from core European bodies by the European Innovation and Technology Institute and the Innovation Ecosystems calls are rather focused on providing funding opportunities for setting up innovation ecosystems instead of particularly financing individual companies, these calls were further excluded from the scoping process. On the other side, the EIC Accelerator calls were identified to be operated by the European Innovation Council, serving as the core of the Horizon Europe funding framework. Moreover, the EIC Accelerator primarily supports companies between technology readiness level 5-8 to reach market readiness. These innovative applicants already have working prototypes and are very close to the market, indicating a defined business plan which can be still flexibly modified to prove the impact creation potential during the funding application. Given that the EIC Accelerator applicant companies are under much pressure

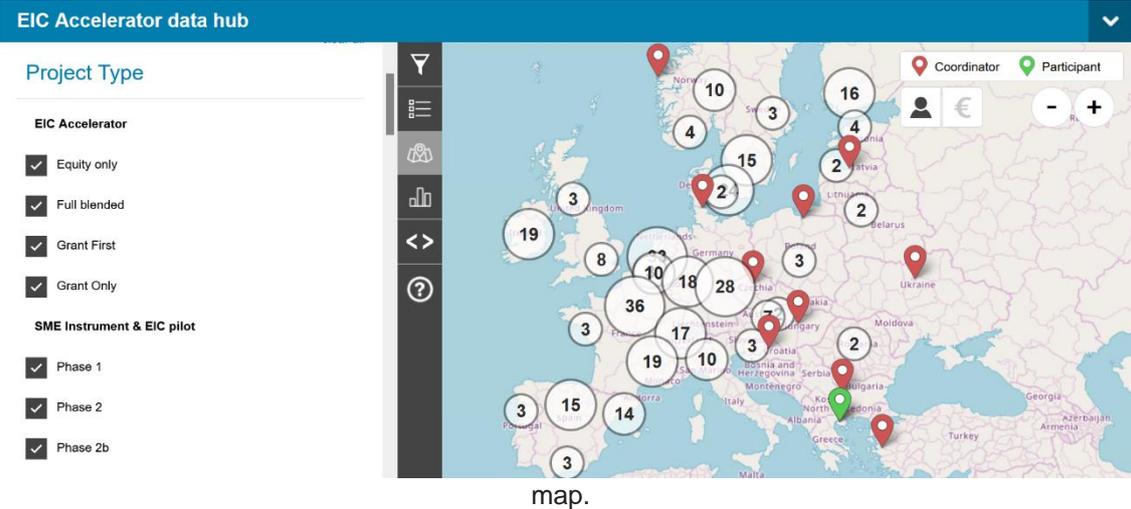
to show the technology grant evaluators that their business model can be adapted to a variety of future target markets to rapidly scale up their innovation, they are likely willing to incorporate the latest sustainability models into their business plan to enhance their competitiveness at the funding program. Therefore, these companies were concluded to be the primary focus of this study to understand the applicability of the latest sustainability models in practice.

Finally, upon identifying the Horizon Europe EIC Accelerator applicants as a potential target pool of companies, the applicant pool was further analyzed to identify the most relevant cases to obtain practically relevant insight on the applicability of sustainability models. Thus, applicants of the program were further grouped into potential applicants, current applicants, and previous applicants. As the European Innovation Council already evaluated the impact creation potential of previous applicants, the scope was further narrowed down to this group of applicants to satisfy the practicality aspect. At this point, the pool of previous applicants was further divided into previous winners and losers of the grant program. Given that in case of previous winners, the assigned evaluators of the European Innovation Council already concluded that these companies include models with strong impact creation potential for the EU, the applicability in practice of the applied models was confirmed. Therefore, previous winning participants of the EIC Accelerator program were eventually selected to be the primary study group where the analysis of the applied sustainability models was assumed to give the most precise indication of what sustainability models can be useful in practice and which are potentially the most relevant for young innovative companies in diverse sectors across the EU.

Step-by-step design of the research project: download the EIC Winner Database

After finalizing the structural design of the research project, during the first step, the list of previous winning companies of the EIC Accelerator was retrieved from the EIC data hub website (see Figure 2. below). Applicants from 2020 and 2021 were obtained to represent the latest complete year of the funding program and the previous year to allow for identifying trends in the emergence and decline of various models across the time span. During this step, a list of 391 former EIC Accelerator winning participants were retrieved.

Figure 2. The EIC Accelerator data hub provides comprehensive information about the description and statistics of projects & companies funded under the EIC Accelerator, along with an interactive



Source: <https://sme.easme-web.eu/>

Categorize the companies

In the second step, the previously obtained list of 391 winning companies was narrowed down to focus the study on applicants with higher likelihood of variably applying a larger combination of sustainability models to give better insight on how various sustainability models are related to each other, allowing a better clustering of their relationship. Therefore, the 391 winning applicants were further categorized into 13 distinct thematic categories based on the official Horizon Europe topic keywords. The categorization process included the manual revision of each company's description that was retrieved from the EIC Accelerator data hub profile of the applicant and its matching with the different Horizon Europe topic keywords. Each company was placed into one of the 13 distinct thematic categories based on the highest relevancy of the present keywords in its description (see Figure 3. below).

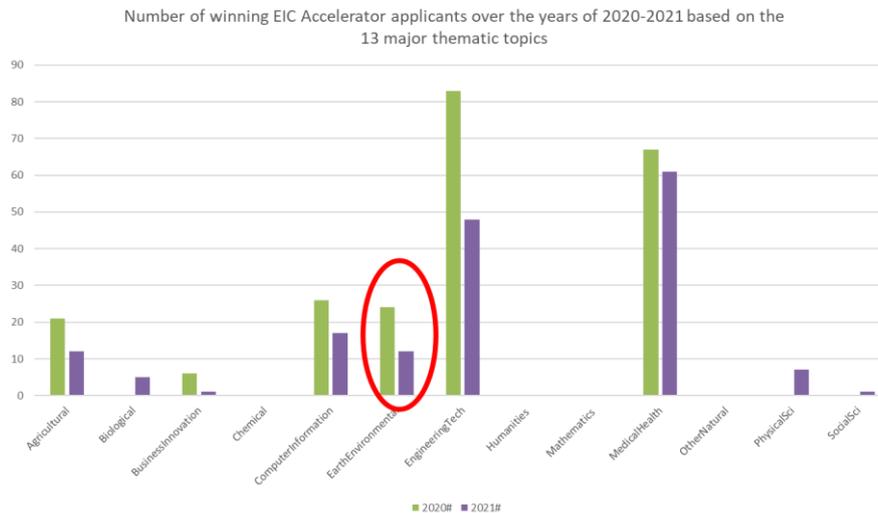
Figure 3. Summary table regarding the distribution of the number of winning EIC Accelerator participants within the year 2020 and 2021 according to the 13 thematic Horizon Europe EIC Accelerator categories.

Horizon Europe EIC Accelerator Category	Winning Applicants 2020#	Winning Applicants 2021#
Agricultural	21	12
Biological	0	5
Business Innovation	6	1
Chemical	0	0
Computer Information	26	17
Earth/Environmental	24	12
Engineering/Tech	83	48
Humanities	0	0
Mathematics	0	0
Medical/Health	67	61
Other/Natural	0	0
Physical Sci	0	7
Social Sci	0	1

Select the most relevant thematic category

After categorizing the 391 companies into the 13 thematic categories, the Earth/Environmental thematic category was identified with the highest likelihood to include applicants with a particular focus and strong relation to involving sustainability practices and the potential inclusion of a variety of sustainable model pattern combinations (see Figure 4. below). In this way, the sample pool of applicants for the study was narrowed down to a targeted group of 36 companies within the Earth/Environmental category.

Figure 4. Summary diagram regarding the distribution of the number of winning EIC Accelerator participants within the year 2020 and 2021 according to the 13 thematic Horizon Europe EIC Accelerator categories, highlighting the Earth/Environmental category with a particular focus and strong relation to involving sustainability practices and the potential inclusion of a variety of sustainable model pattern combinations.



Clean the selected dataset

After identifying the distinct list of 36 winning companies within the Earth/Environmental thematic category, each of the included applicants were manually checked in order to confirm that the description regarding their proposed technology and business model is available in adequate quantity and quality of details which enables the comparison of the outlined business plan with the potential 40 sustainability models. During this data cleaning process, 5 companies were removed from the applicant pool due to very limited available information about them on their EIC Accelerator data hub applicant profile which prevented their further analysis. At the end of this process, 31 former winning EIC Accelerator applicants were selected for the eventual analysis.

Matching the sustainable models with the former winning EIC Accelerator applicants

After selecting the eventual list of 31 former winning EIC Accelerator applicants, the proposed technology of each innovative applicant was analyzed and individually compared to each of the 40 sustainability models categorized within the 40 Circular Economy Business Model Patterns categorization framework from the BMI Institute to identify the applicability of each model that can be applied to the particular technology and associated business plan of each applicant.

During the sustainable model pattern matching process, value '0' was given to a particular sustainability model which didn't appear in the description of the selected 31 former EIC Accelerator winner applicants, or its inapplicability could be safely assumed based on the available technological description including the applicant's business model. In a similar manner, value '1' was given to a sustainability model which was likely to be present in the business model of the applicant based on the retrieved technological project description (see Figure 5. below).

Figure 5. Snapshot of the sustainable model pattern matching table. Value '0' was given to a particular sustainability model which didn't appear in the description of the 31 selected former EIC Accelerator winner applicant, or its inapplicability could be safely assumed based on the available technological description including the applicant's business model. In a similar manner, value '1' was given to a

sustainability model which was likely to be present in the business model of the applicant based on the retrieved technological project description.

Data normalization

Upon finalization of the sustainable model pattern matching table and the allocation of ‘0’ and ‘1’ values to each of the 40 sustainability models in case of the 31 winning applicants, a data normalization process was undertaken. As the number of retrieved companies from 2020 and 2021 were different, the rate of presence of the different models for the two observed years were normalized to avoid any data misinterpretation issue that would arise from one sustainable model being considered to have too high appearance, while, in reality, its emergence would only happen due to more companies analyzed in that particular year, and not due to increased popularity of the model.

	A	B	C	D	F	G	H	I	J	K	L	M	N
					S4 - Intelligent							DB -	
1	Participant	Project acronym	Project title	Year	S1 - Product Reuse	S2 - Part Reuse	S3 - Re-Assembly & Upcycling	S4 - Intelligent Modularity	S5 - Biodegradability	S6 - Waste as Input	S7-Reverse Logistics	Increased Longevity	D9 - Smart Assets
2	BIOWEG	Bioweg	A zero waste process for producing all natural, biodegradable rep	2021	0	0	0	0	1	1	0	0	0
3	CO2BioClean GmbH	CO2TEXTILE	Ovel business model enabled by a patented fermentation techOlog	2021	0	0	1	0	1	1	1	0	0
4	Circular Materials	STOP WASTIN' M	Supercritical Treatment of Process Wastewaters from Surface Tre	2021	0	0	1	0	0	0	1	1	0
5	Kaffe BueO	KB-BIOREFINERY	A biorefinery for upcycling coffee waste into sustainable, healthy,	2021	0	0	1	0	1	1	0	0	0
6	LEKATECH OY	RHIO	Electric bReaker Hammer transforming the mining aNd cOnstruct	2021	0	0	0	1	0	0	0	1	1
7	Minalyze AB	SensAI Mining	SensAI: The digital transformation of the mining industry that will	2021	0	0	0	1	0	0	0	0	1
8	Ocean Oasis AS	ReWater	Offshore renewable and clean desalination of sea water	2021	0	0	0	0	0	0	1	1	0
9	Orisk BV	Binspector	Cutting-edge food waste solution for restaurants	2021	0	0	0	1	0	0	0	0	1
10	PlanBlue GmbH	BLUESURVEY	Unlocking the value of a blue ecoOmy with a revolutionary Unders	2021	0	0	0	1	0	0	0	0	1
11	Recycleye Ltd	RESOURCE	REcovery of target materialS frOm mUnicipal solid waste strEams	2021	0	0	0	1	0	0	0	0	1
12	Seqana	Seqana GmbH	Seqana GmbH	2021	0	0	0	1	0	0	0	0	1
13	iFLUX nv	iFLUX	Real-time flow and flux measurements for combating groundwat	2021	0	0	0	1	0	0	0	0	1
14	Brite Hellas SA	PanePowerSW	Transparent Solar Panel TechOlogy for Energy AutoOmous Greenh	2020	0	0	0	0	0	0	0	1	0
15	CELLUGY	EcoFLEXY	A natural and biodegradable naOcellulose alternative to plastic bar	2020	0	0	0	0	0	1	0	0	0
16	HYDRO VOLTA	SoniED	Desalination techOlogy for the water challenge of the 21st century	2020	0	0	0	0	1	0	0	1	0
17	KEYOU GmbH	H2Engine	Sustainable. Clean. Uncompromising. The Internal Combustion En	2020	0	0	0	0	1	0	0	1	0
18	N2 APPLIED AS	SmartNitroFarm	Local fertiliser production by plasma treatment	2020	0	0	0	0	1	0	0	0	0
19	NVP ENERGY LIMITAMBI-ROBIC	AMBIent Temperature AnaerOBIC Treatment of Municipal Sewag	2020	0	0	1	0	1	1	0	1	0	0
20	OTECHOS AS	CRCP	First liquid tolerant Centric Reciprocating Compressor enabled to f	2020	0	0	0	0	1	0	0	1	0
21	OXYLE AG	WATERACT	WAstewater Treatment using Efficient Reactors integrated with Ai	2020	0	0	1	0	1	1	0	1	0
22	PLANET CARE RESIF Fibrestop	Ovel in-build filters for washing machines to stop microfibre polk	2020	0	0	0	1	0	0	0	0	0	0
23	RANMARINF TFCH WasteShark	The mission of RanMarine TechOlogy is the desien. development a	2020	0	0	0	0	1	0	0	0	0	1

Creation of sustainability model distribution diagram

After the data was collected, analyzed, and normalized, sustainability model distribution diagrams were created to visualize the frequency of the different sustainability models and look for different trends among the companies during the selected timespan.

Elimination of subjective bias

As the last step of the methodology, upon observing visually apparent differences in the depicted data regarding the frequency of sustainability model integration, each case was carefully checked to avoid that a particular difference is considered to be relevant subjectively, while in reality, the objective assessment would indicate that the identified difference happened due to the relatively small pool of analyzed applicants forming the scope of the project.

Results

The evaluation of the depicted overall distribution of sustainability model patterns across the Horizon Europe EIC Accelerator winning participants in the Earth/Environmental category across 2020-2021 showed that among the 40 individually analyzed sustainability model patterns, 3 sustainability models, namely the ‘Produce on Demand’, the ‘Eco Lock-in’, and the ‘Eco-Efficiency’ were the most applicable sustainability model patterns for the 31 winning thematic companies (see Figure 6. below).

Figure 6. Distribution diagram of sustainability model patterns across Horizon Europe EIC Accelerator winning participants in the Earth/Environmental category across 2020-2021. 3 sustainability models, namely the 'Produce on Demand', the 'Eco Lock-in', and the 'Eco-Efficiency' were the most applicable sustainability model patterns for the 31 winning thematic companies.

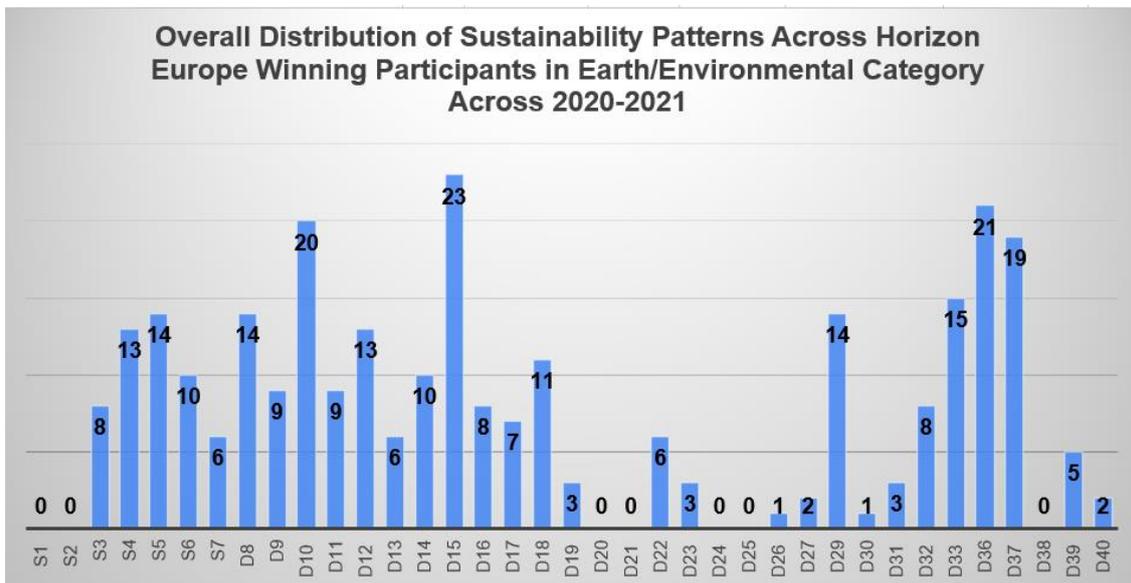


Diagram annotations:

S1 - Product Reuse	D20 - Rent instead of buy
S2 - Part Reuse	D21 - Performance-based contracting
S3 - Re- & Upcycling	D22 - Subscription
S4 - Intelligent Assembly & Modularisation	D23 - Fractionalised Ownership
S5 - Biodegradability	D24 - Dynamic Pricing
S6 - Waste as input	D25 - Revenue Sharing
S7 - Reverse Logistics	D26 - Crowdfunding
D8 - Increased Longevity	D27 - Take-back
D9 - Smart Assets	D29 - Servitisation
D10 - Eco-Efficiency	D30 - Circu-luxury
D11 - De-Materialisation	D31 - Experience Selling
D12 - Eco-Materials & Sourcing	D32 - Marketplace
D13 - Increased Functionality	D33 - Prosumer
D14 - Localisation	D36 - Eco Lock-in
D15 - Produce on demand	D37 - Communicate Responsibility
D16 - Detox	D38 - Sharing
D17 - Energy Recovery	D39 - Robin Hood
D18 - Renewable Energy	D40 - Mass customization
D19 - Pay per use	

The significant applicability of the 'Produce on Demand' sustainability pattern to innovative early-stage companies across a variety of industry sectors apparently indicated that the 'Produce on Demand' pattern many times combines with other sustainability models. Therefore, the potential connection of the 'Produce on Demand' pattern to the other 39 models within the BMI Institute's categorization framework was analyzed to understand to reason behind the extraordinarily high appearance of this pattern by potentially discovering underlying connections with other sustainability models. However, no difference was observed for the distribution of other models among all winning applicants and the selected group of applicants implementing the 'Produce on Demand' model, as no difference was observed between the frequency of appearance of the other 39 models for this particular group (see

Figure 7. below).

Figure 7. Comparison diagram depicting the distribution of sustainability model patterns across Horizon Europe EIC Accelerator winning participants in the Earth/Environmental category (blue group) and the selected group of participants implementing the 'Produce of Demand' model (red group).

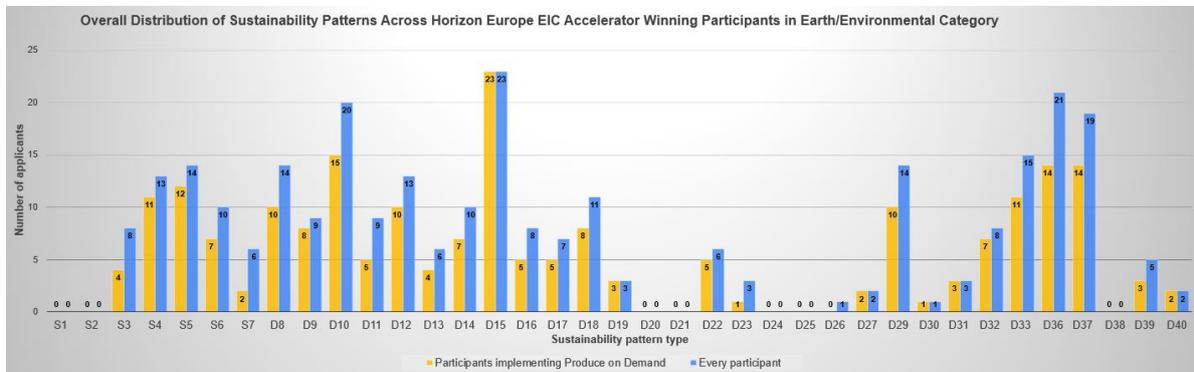


Diagram annotations:

S1 - Product Reuse	D20 - Rent instead of buy
S2 - Part Reuse	D21 - Performance-based contracting
S3 - Re- & Upcycling	D22 - Subscription
S4 - Intelligent Assembly & Modularisation	D23 - Fractionalised Ownership
S5 - Biodegradability	D24 - Dynamic Pricing
S6 - Waste as input	D25 - Revenue Sharing
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D16 - Detox	D38 - Sharing
D17 - Energy Recovery	D39 - Robin Hood
D18 - Renewable Energy	D40 - Mass customization
D19 - Pay per use	

Subsequently, the distribution of the different sustainability models in 2020 and 2021 was analyzed to identify potential trends of new model emergence or old model decline within the analyzed timespan, suggesting the potential evolution of sustainability model patterns.

As for emerging new models, significant changes were observed in the appearance of novel sustainability models with 'Servitisation' and 'Smart Assets' being the most dominantly appearing patterns in 2021 (see Figure 8. below).

Figure 8. Comparison diagram depicting the change in the frequency of appearance of different sustainability models across Horizon Europe EIC Accelerator winning participants in the Earth/Environmental category in 2020 (blue group) and in 2021 (red group). Red rectangles highlight 'Servitisation' and 'Smart Assets' as the most dominantly appearing patterns in 2021.

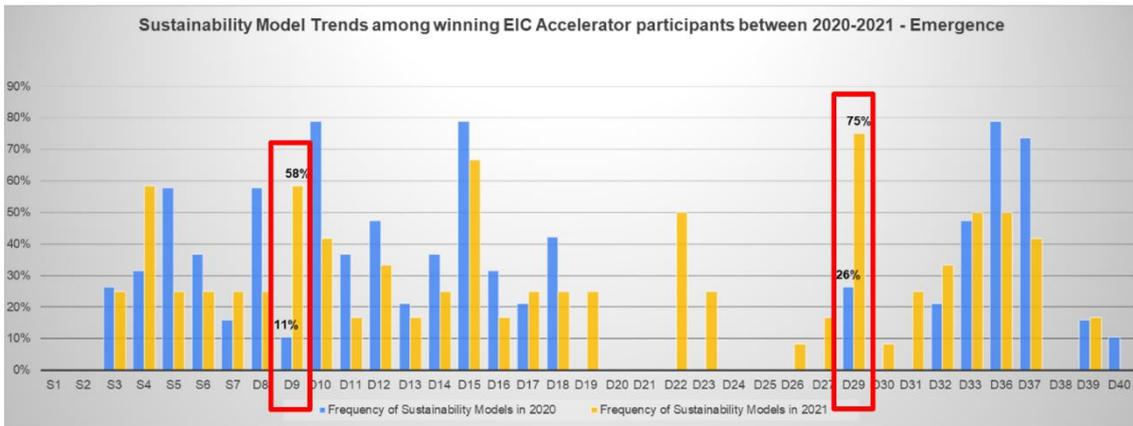


Diagram annotations:

S1 - Product Reuse	D20 - Rent instead of buy
S2 - Part Reuse	D21 - Performance-based contracting
S3 - Re- & Upcycling	D22 - Subscription
S4 - Intelligent Assembly & Modularisation	D23 - Fractionalised Ownership
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D15 - Produce on demand	D37 - Communicate Responsibility
D16 - Detox	D38 - Sharing
D17 - Energy Recovery	D39 - Robin Hood
D18 - Renewable Energy	D40 - Mass customization
D19 - Pay per use	

Finally, in regard of declining old models, similarly significant changes were observed in the disappearance of old sustainability models with 'Eco-Efficiency' and 'Communicate Responsibility' being the most significantly declining old patterns in 2021 (see Figure 9. below).

Figure 9. Comparison diagram depicting the change in the frequency of disappearance of different sustainability models across Horizon Europe EIC Accelerator winning participants in the Earth/Environmental category in 2020 (blue group) and in 2021 (red group). Red rectangles highlight 'Eco-Efficiency' and 'Communicate Responsibility' as the most significantly declining old patterns in 2021.

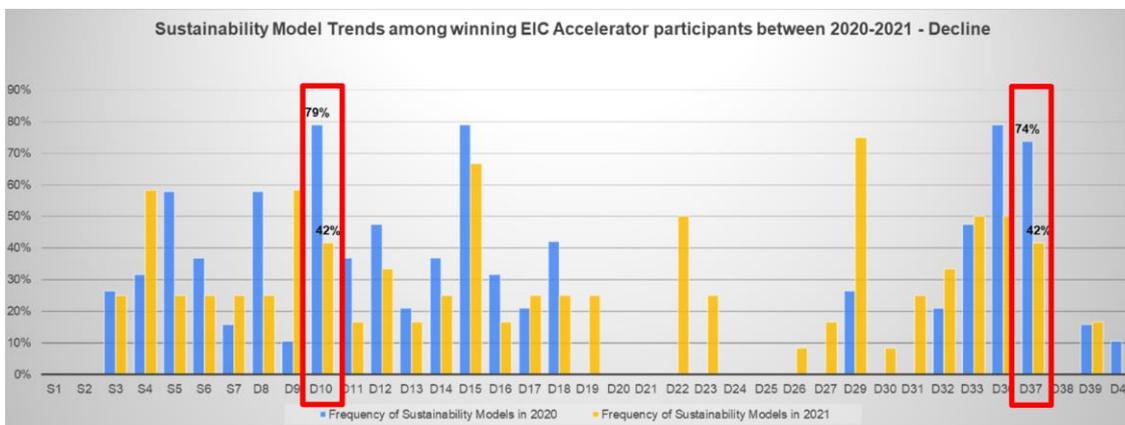


Diagram annotations:

S1 - Product Reuse	D20 - Rent instead of buy
S2 - Part Reuse	D21 - Performance-based contracting
S3 - Re- & Upcycling	D22 - Subscription
S4 - Intelligent Assembly & Modularisation	D23 - Fractionalised Ownership
S5 - Biodegradability	D24 - Dynamic Pricing
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D18 - Renewable Energy	D40 - Mass customization
D19 - Pay per use	

Conclusion

The distribution of the different sustainability model patterns showed that there is no significant difference between the frequency of how the different sustainability business model patterns are connected to each other in general and in case of the presence of the mostly applicable 'Produce on Demand' pattern. Based on this, the conclusion of initial results suggests that there is only a distant, less relevant direct relationship between various sustainability models, particularly regarding the connection of various sustainability business models and the 'Produce on Demand' pattern, indicating a low potential influence on each other.

This suggests that the combined use of different models is rather influenced by other aspects of the business plan designed for the implementation of the innovative technology, for example, the early-stage company's specific technology and the specific business/sales model that it used to reach the particular environment in the targeted markets.

Furthermore, the changes in the frequency rate of different sustainability models between 2020 and 2021 contributed to the observation of significant dynamic changes both in the appearance and disappearance of various sustainability models across this timespan.

Several new sustainability models appeared in 2021 from a zero presence from 2020, where an initial conclusion can be drawn given the number of different appearing novel sustainability models. This suggests an increasing complexity in the applied sustainability model patterns over the years.

In a similar fashion, several older sustainability model patterns from 2020 started to disappear in 2021, although no models disappeared completely. Among the 40 analyzed sustainability models, only the column in association with the 'Mass Customization' pattern was observed to have disappeared. However, given that this particular sustainability model was significantly underrepresented in the study group with having the lowest frequency diagram for 2020 among all patterns, the disappearance of the column in 2021 is assumed to happen due to the limited number of applicants forming the study group of the research project.

The continuously growing number of implemented sustainability model patterns indicate that innovative early-stage companies need to apply a more and more complex combination of sustainability model patterns in their business development strategies over the years. This complexity is likely driven by societal trends and the evolution of more and more complex business model design.

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Determinant factors of information disclosure on sustainability reporting in Vietnam

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Abstract

Purpose: Sustainability reports in recent years have always received significant attention from stakeholders because of the benefits that stakeholders bring. This examination explores the factors that impact the sustainability of the firm's disclosures in Vietnam's stock market.

Design/methodology/approach: This research used the systematic literature review method to construct the theoretical model and investigated the levels of impact of determinants on information disclosure and transparency to achieve business sustainability in Vietnam's setting.

Findings: The expected result has recognized three elements that influence the disclosure category: Company size, company type, corporate governance committee, and audit committee meeting. However, two factors do not impact the group of information disclosure: financial leverage, the number of members of the board of directors, and the leader & general manager.

Practical implications: This outcome will propose recommendations to help companies enhance the quality of social responsibility and sustainability reporting.

Originality/Value: In Vietnam, although the work of the sustainability report independently of the annual report brings more credibility than integrated reports, most businesses integrate this information into their annual reports. Therefore, to have a clearer view, in this study, the author will clarify the degree of influence of factors on the publication of independent sustainable development reports.

Keywords: Information disclosure, sustainability report, corporate governance committee, Vietnam listed companies

Introduction

Environmental sustainability is currently a pressing global issue. Gray (2001) assessed the need for environmentally sustainable development by providing estimates of human overexploitation of natural resources. When the environment is increasingly affected by damaging effects, the ozone layer is severely affected, leading to global warming and climate change; businesses need to change how they do business.

As a result, corporate sustainability has evolved into a competitive advantage for businesses (Ojo et al., 2015). The World Business Council for Sustainable Development (2002) has represented corporate sustainability as a responsibility that company activities donate to sustainable economic expansion and enhance employees' quality, families, the regional community, and culture.

Current reality in Vietnam background shows that listed companies in stock exchange also have to report on sustainable development activities in addition to financial information. Sustainability reporting (SR) complements financial statements to fully inform the business concerning related parties when conducting business activities. In addition, SR is information of enterprises about their commitments to sustainable development and activities to fulfill these commitments.

The author will present an overview of SR content. From there, the article will evaluate the decisive factors affecting the disclosure of this report. The article desires to fulfill the following goals: Deliver a summary of corporate social responsibility, environmental responsibility, sustainability, and sustainability reporting. Therefore, this study examines the factors influencing the disclosure of sustainability reporting in Vietnam's stock market.

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Corporate sustainability reporting in Vietnam

In Vietnam, Circular No. 155/2015/TT-BTC dated October 6, 2015, was developed and issued by the State Securities Commission to guide information disclosure on the stock market with general information about the environmental, social, and corporate governance annual report template. This document has raised awareness among businesses about the need for sustainability reporting. Enterprises publish sustainability reports to prove that they operate following the National Green Growth Strategy and international standards for environmental protection and maintaining social stability. Therefore, from January 1, 2018, listed companies began to publish information related to sustainable development in their annual reports. However, enterprises' level and manner of information disclosure are not as expected. Specifically, the research results of Pham (2016) show that, although the situation of making sustainability reports of enterprises has improved, the level is still sketchy and not up to standards. In addition, in the poll of listed companies in 2018 together classified by the Vietnam stock exchange and the Investment journal, it was found that the majority of enterprises put their content on environmental and social topics in the Annual Report. However, primarily, listed firms publish sustainability reports according to the latest GRI standards with high reliability only at "10".

A review of previous studies (Kuzey et al., 2017; Nguyen, 2020; Sonia and Khafid, 2020) shows that motivates companies to publish or not publish sustainability reports. The reasons companies publish sustainability reports are: (1) increased control over the process of achieving specific goals; (2) supporting the performance of the environmental approach; (3) raising understanding of environmental problems; (4) conveying the message to the business; (5) improve transparency; (6) improve standardization; (7) operating license; (8) reputation, improve development opportunities. Meanwhile, the reasons why enterprises do not publish sustainability reports are: (1) uncertainty about the benefits of information disclosure; (2) competitors do not disclose information; (3) the customer is not interested; (4) has a good reputation in protecting the environment; (5) there are other ways to communicate environmental issues; (6) high publication costs; (7) it is difficult to collect data synchronously from all business activities; (8) may damage the reputation of the business.

Currently, sustainability reports are mainly published voluntarily. Therefore, businesses are flexible in providing sustainable development information. Sustainability reports can be provided in a multi-pronged or integrated form but can also be provided unidirectionally as an environmental report or a social responsibility report. Within the scope of this research, an SR is a report that analyzes factors affecting the sustainable development of an enterprise, including environmental, social, and economic impacts. Therefore, to have a more precise outlook, in this work, the author will examine the degree of impact of factors on the public of the sustainable development report independent of the AR of the large enterprises on the Vietnam stock market.

Research gap

Recent studies in Vietnam on the Sustainability Report are few. Typically, Nguyen (2020) researches, summarizes and proposes future research models, or Karaman et al. (2018) clarify definitions, trends, content issues, and theories. So why is sustainability reporting needed? Most recently, Dang & Pham (2022) studied the status of information disclosure on sustainable development and social responsibility in the annual reports of firms in Viet Nam. While the publication of the sustainability report independently of the annual report provides credibility, most businesses incorporate this information into their annual reports, as mentioned above. Therefore, to have a clearer view, in this study, the author will clarify the degree of influence of factors on the publication of the sustainable development report independent of the AR of the large companies on the Vietnam stock market.

Theoretical Background

Operational definitions

Definition of Corporate Sustainability

Eccles and Krzus (2010) found that there has been worldwide concern around the long-term adverse effect of mechanical exercises on the environment, diminishing businesses and countries' financial execution. Environmental impacts incorporate the greenhouse impact, harmful substances, contamination produced amid generation, and ozone layer exhaustion. Require businesses to publicize data on environmental impacts, illustrating their commitment to natural maintainability. Numerous analysts have appeared that supportability is assembly wants of the display era without compromising the capacity of future eras to meet their claim needs.

According to Elkington (1998), sustainability comes from an adjustment of three angles, counting profit (financial), people (society), and planet (environment). Hence, SR is an unavoidable result for businesses to declare and be responsible to partners for their exercises towards sustainable development. Enterprises that create and distribute SRs assess and uncover data around their commerce execution concerning natural and social perspectives and financial and administration execution data. SR may be another way to construct and evaluate business esteem. SR makes a difference businesses and organizations unveil sustainability information additionally to financial statements.

Through transparent, accountable, and responsible report, businesses reinforce stakeholder certainty within business and the economy. The announcing handle at the same time promotes changes in numerous aspects of production and commerce exercises. At a most basic level, sustainability repors could be a device to move forward an enterprise's mindfulness of new corporate dangers and chances. From this point of view, SR makes a difference in businesses getting ready for new advancement patterns, decentralizing obligations, and making strides in administration frameworks to move operational productivity steadily.

Disclosure of sustainability report

Circular Number 155 of the Vietnam Ministry of Finance is the first legal document requiring listed firms on the Vietnamese market to disclose sustainable development reports. Listed companies can make their SR or make an integrated representation in the AR. The substance that companies must report on the impact on the environment and society incorporates unequivocally six issues:

1. Administration of crude materials
2. Vitality utilization and water utilization
3. Comply with the law on natural assurance
4. Approaches related to workers
5. Detailing related to the obligation to the neighborhood community
6. Report related to the green capital market

After more than four years, Circular No. 155 has come into force so far, and the SR of listed companies has significantly developed. The financial year 2016 is the initial year that businesses have to report on sustainable development information, so many businesses are still passive, the content of the report is sketchy, and some businesses even ignore this content. However, by 2017, only a few listed companies had not shown the content of sustainable development in the report.

In the fiscal year 2020, the SR situation of listed companies has gradually stabilized. Most of the enterprises presented the content of SR integrated into the annual report, and the presented content complied with the requirements of Circular No. 155/2015/TT-BTC. Some businesses present their SR with rich report content.

Typical high-quality SR suppliers are Baoviet Group, FPT, Vincom, Vinamilk, Vingroup Corporation, and Securities section. Ho Chi Minh City, PetroVietnam Fertilizer and Chemicals Corporation, Hoa Sen Group, Gemadept Joint Stock Company (Nguyen, 2020). Many enterprises have prepared reports under the guidance of the Global Reporting Initiative (GRI) such as Baoviet Group, FPT, Vingroup, Vietjetair (Dang, 2022). International organizations have highly appreciated these reports, even being honored through awards for sustainability reports.

Corporate sustainability information disclosure is in response to the needs and requirements of society for a responsible business enterprise (Frost et al., 2005). In the 70s, society experienced unusual changes from the effects of business activities on enterprises, and enterprises have published social impact reports to inform stakeholders about the influences of business movements on the social situation. In the 80s, the issue of environmental pollution was a topic of great interest, so businesses published environmental impact reports instead of social impact reports to inform the community about the impacts of pollution business activities on the surrounding environment. The social impact report, environmental impact report, or sustainability report together demonstrate the link between the enterprise's development plan and the obligation to the sustainable development of the global economy in which social and environmental issues are focused on protecting and maintaining stable development. According to Hahn and Kühnen (2013), sustainability reporting and social responsibility reporting are similar concepts.

Fundamental Theories

Disclosure or non-disclosure is one of the critical decisions for businesses because the results from this can be positive, or it can be harmful. Specific theories also explain the act of disclosing or not disclosing business-related information of managers.

Agency Theory

The theory of agency (also known as the theory between the principal and the agent), a classical theory in organizational economics, was first proposed by Ross (1973). This theory explains economic relationships between two parties (such as between owners and employees, between executives and shareholders, between buyers and sellers) that have heterogeneous goals. The purpose of agency theory is to define contracts and optimal contract performance conditions to minimize adverse consequences. Based on the core assumption that humans are self-interested and risk-averse, this theory can be applied at the individual or organizational level.

The two parties in this theory are the owner and the management agent; An employer hires a representative to perform specific tasks on his or her behalf. While the employer's goal requires the fast, efficient completion of assigned tasks, the agent's goal is to work at his or her own pace, avoid risks, and seek personal gain (as personal income) among the interests of the company. Therefore, their targets are not compatible. Therefore, agency theory recommends building employment contracts based on performance (output), such as commissions or bonuses paid based on job performance. Alternatively, they can enter into a mixed contract based on both behavior (working time) and work results. Employee authorization contracts are an example of an outcome-based contract, while employee pay is a behavior-based contract.

Signalling Theory

Signal theory has been mentioned since the early 70s of the twentieth century; until 1973, Spence conducted research on the labor market and came up with the theory of signals through the research results. To get a job, it is necessary to signal, that is, to provide personal information to the labor market to reveal one's ability.

Then, Bini et al. (2010) suggested that firms with high profitability would provide explanations to increase their competitiveness. Thus, the theory of signaling is based on asymmetric information; when there is information asymmetry, the information holder needs to send a signal to the party that needs the information to achieve a particular goal. In a joint-stock company, asymmetric information appears in the relationship between managers and shareholders and in the relationship between the enterprise and its stakeholders. Concurring to the same theory, the more critical the firms, the more prominent the data asymmetry. Moreover, firms with higher productivity tend to reveal more data to provide optimistic signals to financial specialists almost development prospects, subsequently affecting the company's stock price (Moratis, 2018).

Political corporate social responsibility theory

The theory of political power assumes that state administration creates rules and judgments related to the company's interests (tax policy, restriction of monopoly, competition, and so on) based on information obtained announced by companies. As a result, firms will be more aware of information disclosure to limit this political cost. As a result, large, highly profitable firms incur more political expenses and willingly disclose information (Frynas & Stephen, 2015).

Proprietary Cost Theory

The theory was formulated by Carl Watner (1982) and developed in 1983. According to this theory, costs will be incurred when there is a decrease in future cash flows due to the disclosure of business information. For example, when a business provides terrible news, there will be a cost as investors will reduce investment in that business because of reduced attractiveness. However, providing insufficient information can prevent competitors from entering the market, resulting in future cash flows that can also increase. This also happens in the opposite case when the business has good information; of course, future cash flows will increase. Therefore, increasing the cost of ownership is considered a limitation of information disclosure. These disadvantages will cause managers to consider the information when making it public.

The aim of this paper is exploring the influence of factors on the preparation of sustainability reports in companies in the group of 500 large enterprises (VNR500) listed on the Vietnamese Stock Exchange.

Methodology

A review of previous studies shows that, although there is evidence that sustainability reporting has always received significant interest from stakeholders (Serrano et al., 2007, Ettredge et al., 2002; Oyelere et al., 2003), however the quantity and quality of information disclosure is still limited (Prado & Garcia-Sanchez, 2010). Furthermore, these studies have shown inconsistent results when tested in emerging markets.

Most of the previous studies used one or few mechanisms in the model, such as firm size, firm performance, company industry, and other corporate governance mechanisms to assess the quality of sustainability reporting.

Finally, only a few studies (Khanh and Tuan, 2018; Oanh et al., 2021) in Vietnam have applied a more comprehensive tool to measure and score the quality of corporate sustainability reporting.

We used a systematic literature review to build our theoretical model. The result is a basis for stakeholders to take appropriate actions to promote the publication of this type of report in the future.

Literature review

Company size and Disclosure of Sustainability Report

There is quite evident that large enterprises often disclose more information about sustainability and social responsibility than the rest (Salehg et al., 2011; Jitaree, 2015; Platonova et al., 2016). This conclusion is that large companies are receiving more attention from the public, as these companies are more likely to diversify geographically and products. This company may have more extensive and diverse stakeholder groups. This is consistent with the fact that, according to the agency theory, the separation of the roles of the owner and the direct manager will lead to several types of costs, called monitoring costs, link costs, and other costs (Jensen & Meckling, 1976). Meek et al. (1995) assessed firm size, regional geography, and international listing status as the most important factors explaining voluntary disclosure. Fathi's study (2013) also shows the multi-dimensional influence of company size and information disclosure level. It can therefore help them prepare and publish an independent sustainability report.

H1. Size of the company is positively related to sustainability disclosure

Industry type and Disclosure of Sustainability Report

Karlina et al. (2015) argue that different industries will have different features depending on growth prospects, number of workers, rivals, and state intervention. Fernandez et al. (2014) define an industry as an economic activity that manages raw materials and uses industry resources to produce higher value or benefit goods, including services. An example of a high-risk company would be a mining business whose characteristics use high-tech equipment nearly 24 hours a day and involve multiple vehicles and infrastructure. As a result, it has driven many tragic accidents, even loss of life. So different

types of industries reveal the quality of information. For example, businesses with a more elevated level of risk disclose better information in their sustainability reports.

Sinaga & Fachrurrozie (2017) argue that manufacturing companies disclose better information than non-manufacturing companies. Meanwhile, Reverte (2009) found that firms in the environmentally sensitive industry have high ratings. Therefore, the company hopes to communicate information on the implementation of economic, environmental, and social responsibility through sustainability reports to build confidence among stakeholders.

H2. Industry type is positively related to sustainability disclosure

Sustainability Report Disclosure and Governance Committee

The Corporate Governance Committee is a committee established and accountable to the Trustees to assist in the performance of the Commission's duties and responsibilities in reviewing corporate governance policy and assessing the integrity of the Company. Consistency in applying corporate governance, including those related to business ethics and corporate social responsibility (CSR). The Board of Directors is a committee consisting of several members of the Board of Directors (Mitchell & Hill, 2009) and forming good, solid, and sustainable corporate governance, carrying out regular activities and appointing independent directors, conducting regular board meetings corresponding to the Board of Directors or appointing independent audit committee member. It requires additional committees to be established. An additional committee was established as the governance committee. The Sustainability Governance Committee report, known as the Nominations and Compensation Committee, is tasked with helping accountable directors and their trustees support good corporate governance. The application of sound corporate governance principles by the Company creates harmonization of the efficiency and effectiveness of corporate governance, which can be achieved by establishing governance committees (Buniamin et al., 2011).

When looking at the corporate governance practices of a company, for a good, sustainable and robust operation, it is not only necessary to consider whether the Company is operating normally or not. For example, the appointment of independent directors or not, whose implementation, such as board meetings, the percentage of the Board of Directors, or the appointment of the independent Audit Committee, can also be found through the establishment of company establishment committees as an expression of establishing good corporate governance is vital. The committees formed include the governance committee, the nomination committee, the remuneration committee, the CSR committee, the risk management committee, the budget committee, the investment committee, or other functions. However, more committees can also be seen as a form of business enterprise in which good corporate governance practice is critical.

The Company has developed a sustainability committee, or corporate social responsibility, as a component of its corporate governance structure to address sustainability risks and opportunities (Sonia & Khaid, 2020). In addition, the presence of committees increases sustainability reporting levels because these committees will highlight sustainability problems. Therefore, the presence of a committee can help to integrate sustainability issues better, thus being included in a higher level of concern related to sustainability reporting (Novitaningrum & Amboningtyas, 2017).

H3. The corporate governance committee has a positive impact on the sustainability disclosure level

Liquidity and Disclosure of Sustainability Report

As the company's liquidity level accumulates, so will the publication of sustainability reports. Firms with high levels of liquidity demonstrate a significant ability to pay their short-term obligations on time. In addition, a stable financial condition will encourage companies to disclose more information to ensure the safety of their stakeholders. Sonia & Khafid (2016) argue that liquidity has a considerable positive effect on sustainability declarations.

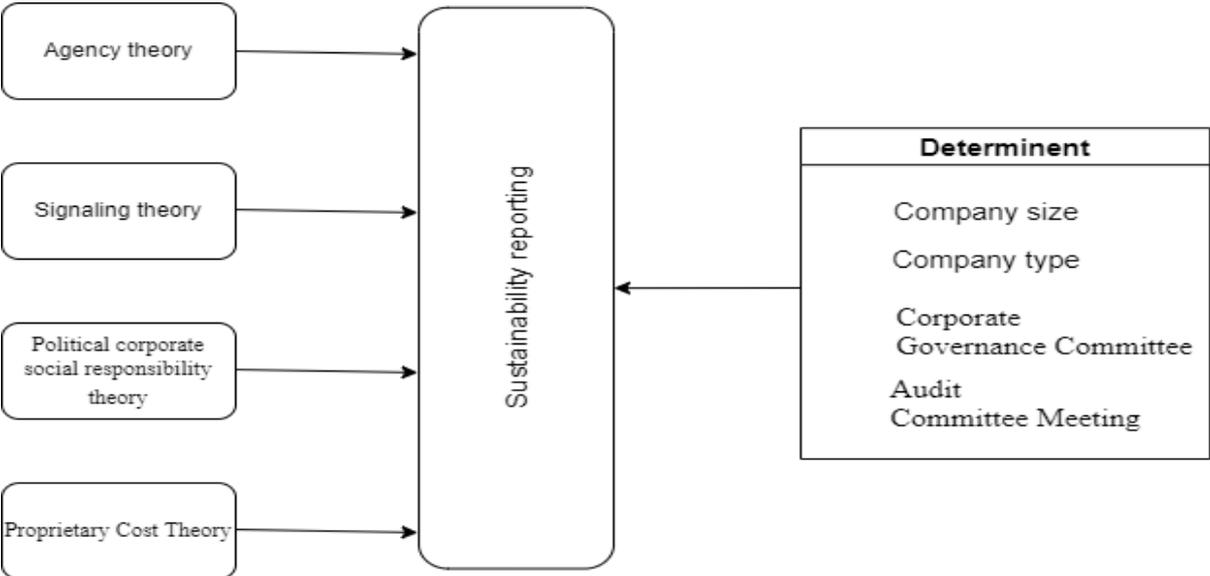
H4. Liquidity has a significant positive effect on sustainability reporting.

Integrative research model

This paper sought to answer two research questions: What are the factors influencing sustainability report publication? What is the influence of these factors on preparing sustainable development reports? Through an extensive review of the literature, we have developed an integrative research model that covers the theoretical elements, evidence from empirical studies and metrics for assessing quality of sustainability reporting. This model will be of use to researchers in this field, and practitioners in understanding the interrelationships, and key considerations from both reporting quality and governance perspectives.

Based upon our review of the literature, our assumption that are dependent variables to measure the firm’s financial performance, and the peculiarities of the Vietnamese environment, we propose the following research model:

Figure 1. Proposed integrative research model



Source: author’s own construction

Empirical results and discussion

Through a comprehensive review of the literature, the elements most suited to the context of Vietnamese listed companies were found to be those relating to the four elements covered in the above hypothesis. For our research question, we found that rather than selecting one particular measure, the most significant outcomes could be acquired through a blend of measures, especially in the context of Vietnam. Besides, we found that selecting a single theory may not be appropriate, primarily due to the coexistence of high ownership concentration and high state ownership unique to the Vietnamese environment and may offer potential new future research directions.

In this study, we have consolidated the theories in the framework alongside the key themes that arose in the literature. Although the hypotheses are intended for a Vietnamese study, it is perfectly feasible for the hypotheses found in this study to be tested in other countries, especially in emerging economies. In this way, our study adds to existing research by presenting a consolidated research model through which studies may impact the quality of sustainability reports in greater depth.

According to the analysis results, the publication of sustainability reports of companies listed on stock exchanges is influenced by the following variables: company size, the field in which the company is operating, and company growth opportunities. Return on total assets ROA has no impact on sustainability report publication. In addition, there are differences in the preparation of sustainability reports between state-owned companies and non-state-owned companies. These results partly show that the publication of the sustainability report will help businesses gain external recognition and gain public and investors' trust in the business's sustainable development. For internal businesses, publishing this report helps enterprises control and contribute to cost reduction and emphasizes the

relationship between financial and non-financial activities. Moreover, it helps enterprises formulate strategies to improve brand value. Publishing sustainability reports help businesses build trust, reach consumers, and promote their brands to outside businesses. Besides, it also helps businesses transmit information to shareholders, investors, and management agencies. This is the basis for business managers to have more motivation to publish sustainability reports shortly. It is also a source of information for state agencies to have appropriate policies in promoting enterprises to publish sustainable development reports.

Company size

Firm size has a significant adverse effect on the sustainability report. This suggests that more prominent firms are not essentially responsible for disclosing corporate social, environmental, and economic sustainability reports. This condition indicates that large companies do not always publicize their economic, environmental, and social responsibility reports to obtain legitimacy from stakeholders. This is because the Company's duty is no longer just the activities but the Company's obligation to sustain the Company's viability; On the other hand, even small firms must disclose their responsible corporate events substantially and reasonably. Firms with an upsurge in total assets show a growth in the Company's assets to contribute more to social activities to gain public legitimacy with more and more public social activities. Thus, more information can be revealed in sustainability reporting. In conclusion, large companies with social legitimacy can sustain or improve it. The results of this study support the study of Adhipadana & Daliono (2014), which argues that the size of the Company's significant adverse impact on sustainability reporting does not support previous studies conducted demonstrated by Alinar and Wahuy (2017) that the firm size does not significantly affect the publication of the sustainability report.

Company type

High-risk companies and low-risk categories do not significantly influence sustainability claims. This is due to the lack of specific classifications of industry sectors and the various regulations that have resulted in companies disclosing information unevenly, even within one sector type. Therefore, this study agrees with the previous research but does not support study of SemBires (2005) that the type of industry classified as low-risk and high-risk industries significantly affects SR publishing.

Corporate Governance Committee

The Corporate Governance Committee has no significant influence on the Sustainability Report, Audit Committee, Board of Directors, and Trustees (Lucia & Panggabean, 2018). The Governing Body is solely tasked with supporting directors and trustees, responsible for supporting good corporate governance practices and publishing corporate sustainability reports.

Audit Committee Meeting

The results of empirical processing analysis on a number of studies have shown that the Audit Committee meeting has a significant positive influence on the publication of SR. The results of this study are supported by preceding studies conducted by Dwita & Sri (2017) and Sari & Marsono (2013) but differ from the study by Nasir (2014), affecting sustainability reports. This suggests the presence of an audit committee that supports ensuring the correct functioning of the disclosure and control systems. The more satisfied the audit committee is and communicates with each other regularly, the audit results will be assessed and informed to management to inspire management to provide well disclosure. In addition, to lead to high quality and fair disclosure of the financial statements, the Audit Committee will propose to the Board of Directors for disclosure of information in supplementary reports, especially sustainability development reports.

Summary and conclusion

The finding of this paper is the first crucial positive effect on liquidity (current ratio) on corporate sustainability statement disclosure. The higher the liquidity, the more increased the disclosure level of the sustainability report is. Second, company size has a significant adverse impact on corporate sustainability reporting. This suggests that more well-known organizations are not necessarily responsible for disclosing their financial, environmental, and social information, which would also be more comprehensive. The third type of company does not significantly affect the disclosure of information by companies in Vietnam. The type of company, both low-risk and high-risk, should still publish sustainability reports. However, the specific category and company regulations do not require the company to disclose the SR. The fourth corporate governance committee has no significant influence over publishing a company's sustainability report. It is not the duty of the corporate governance committee to support the policy of trustees and the boards only in determining disclosure SRs. Finally, the audit committee meeting had a significant positive impact on the release of the company's sustainability report. The more often the audit committee meets, the more decisions are made, and the company must be represented through the sustainability report.

This study also has some limitations that need to be considered. The sample size of the study only focuses on companies listed on the Vietnam exchange with full disclosure, so generality is not high. In addition, this is only a theoretical study, so it partially affects the assessment of the impact on the dependent variable (sustainability reporting). Therefore, future studies may extend models that influence sustainability reporting, such as concentration (showing the level of competition or monopoly in a company's field operations). in the industry in which the company operates. It is even possible to use a qualitative research method to look at the problem as it will analyze and deepen the information for the decision-making procedure of managers for the establishment and disclosure of information.

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Responsible tourism issues and solutions based on pre-pandemic data: comparison between Barcelona and Budapest

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Abstract

In recent decades rising sustainability issues highlight the inappropriateness of a growth-led economy and irresponsible approach to tourism planning resulting in the overuse of destinations. This paper intends to compare overtourism trends in Barcelona and Budapest, the first city already suffering from overtourism, while the latter shows an increase in this direction. Analysis of historical and COVID-19 pre-pandemic data in Barcelona is expected to reveal similar weaknesses in the tourism planning and marketing of Budapest's inner city. Sustainable solutions such as a rational approach regarding tourists flowing into the city center or responsible tourism strategies are supposed to enhance livability in Budapest inner city.

Keywords: sustainability, overtourism, responsible tourism, tourism planning

Introduction

According to the statistics published by the United Nations World Tourism Organization, there was an ongoing increase (pre-pandemic) in the number of tourists from 25 million to 1.4 billion in 2018. This trend will continue after the post-pandemic recovery of the world economy. Along with this, there are expectations that mass tourism will continue to grow. Specifically, the number of visitors is expected to reach 850 million in 2030 (UNWTO, 2018), signifying a 60% growth compared to 2010 (Kester 2016; Croce, 2018 in Frey, 2021, p.11). Tourism is one of the fastest-growing sectors of the world economy where the increase is boosted by a growing middle-class population. Therefore, a rapid rise in tourist numbers is expected from China, India, the Arab Countries, Indonesia, Vietnam, etc. Especially, the Chinese market will contribute more to this increase as hundreds of millions of people will have the opportunity to travel abroad (Frey, 2021, p.11). Interestingly, the length of stay in urban destinations has been decreasing over the years. Thus, we experience a trend when tourists in general choose to stay for shorter periods (Gössling et al. 2018). All these factors positively influence the economy as tourism has a multiplier effect on other sectors of the economy. As a result, mass tourism had been appreciated for a long time and many countries were trying to attract as many tourists as possible. Consequently, some European destinations are already suffering from the impacts of overtourism, e.g. Amsterdam, Lisbon, London, Stockholm, and Barcelona leading the list. In this paper, the author compares two European destinations, namely Barcelona and Budapest, in terms of overtourism, and provides some solutions based on Barcelona's negative experience with overcrowding and overuse.

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Literature review

Tourism impacts

There are several ways how tourism affects society in general, they are identified as the Economic, Socio-Cultural and Environmental impacts. Direct impact – in terms of economic gains – refers to the actual cash inflows that are the result of money spent by tourists. This income is distributed through hotels, other accommodation facilities, tourism agencies, transport means food and beverage services, local souvenir shops, etc. (Lundberg, 2014, p. 25). Apart from such direct income, tourism also causes indirect and induced economic effects: higher salaries in local tourism establishments, increased demand for local food supply and transportation services, and also caused an increase in the spending patterns of locals.

When it comes to socio-cultural impact, they lead to changes in beliefs and cultural practices of the local community. Social impact has its effect in the short run, however, cultural influence lasts for a comparatively longer period (Lundberg, 2014, p. 27). Undoubtedly, the interaction between locals and visitors is the main basis for tourist experiences. In certain cases when locals experience negative effects of tourism, hospitality can also be negatively affected (Ap and Crompton, 1993; Lundberg, 2014, p. 28). If such a negative impact persists and locals do not want to cope with the issues anymore, the situation will result in opposition to tourism. There are many examples where such factors led to public protests and demonstrations against further tourism development. This borderline is the Social Carrying Capacity and reflects the local community's ability to cope with tourism-related changes (Yoel, 1992; Lundberg, 2014, p. 29). The degree of the capacity changes depending on the perceived impact of the tourism-related negative effects.

Finally, the environmental impact is assessed by emissions of CO₂ - greenhouse gases, energy use, land use, water use and amount of waste (Lundberg, 2014, p. 30).

Sustainable tourism

The commodification of nature (Katz, 1998) and cities increase over the years as a result of a significant tourism impact (Sørensen and Grindsted, 2021). The process signifies a growth-lead prosperity approach dominating over a sustainability concept. As consequences of such expansion lead to local and global environmental challenges the need for sustainable approaches becomes evident (Sørensen & Bærenholdt, 2020; Sørensen and Grindsted, 2021). Therefore, environmentally friendly tourism modes are proposed: green growth, steady-state and degrowth (Fletcher et al., 2019). In this vein, it is vital to adopt environmental policies, and management measures to change tourists' practices and attitudes. Sustainable tourism is described as “that does not destroy the resources on which the future of tourism will depend, notably the physical environment and the social fabric of the host community” (Swarbrooke, 1999 p. 13, in Sørensen and Grindsted, 2021). UNWTO defines it as: “Tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment and host communities”. In line with the definition, sustainable tourism should make optimal use of environmental resources, maintain essential ecological processes and contribute to conserve natural heritage and biodiversity. Similarly, it should respect the socio-cultural authenticity of host communities and conserve their built and living cultural heritage and traditional values, eventually contributing to inter-cultural understanding. At the practical level, sustainable tourism is supposed to ensure viable, long-term economic operations, providing socio-economic benefits (including stable employment) to all stakeholders and social services to host communities, and, in overall, contribute to poverty alleviation.

To sum it up, sustainable tourism development consists of high-quality experiences for tourists while maintaining and improving the quality of life of host communities (Flagestad & Hope, 2001).

According to the classification used by Sørensen and Grindsted, 2021 these are the definitions of the main modes of sustainable tourism. Green growth tourism de-links economic growth and environmental

degradation (Panzer-Krause, 2019) in the pursuit of increased economic growth while becoming more sustainable (Hall, 2013). Steady-state tourism emphasises qualitative developments – instead of equating development with economic growth – including the quality of life and wellbeing of residents and tourists (Fletcher et al., 2019). De-growth tourism works with principles based on commons creation and conviviality to reduce tourism's material and energy flows and the intensity and impacts of tourists on local populations' lives and environments (Fletcher et al., 2019). Circular economy tourism aims at reducing resource use, emissions and waste without implying a steady-state or de-growth of tourism activities or economic benefits (Sørensen and Bærenholdt, 2020).

Overtourism

The effects of tourism have been examined in recent years and the outcome of the research was defined as the concept of overtourism. One of the main questions, in this case, considers the benefits for host communities: how can they be elaborated and what can be the drawbacks of tourism? According to (IPOL in *TRAN Committee Authors, 2018*) “Overtourism describes the situation in which the impact of tourism, at certain times and in certain locations, exceeds physical, ecological, social, economic, psychological, and/or political capacity thresholds.” Among the challenges, there are some alienated residents, degraded tourist experiences, an overloaded infrastructure, damage done to nature, or threats to culture and heritage (*TRAN Committee Authors, 2018*). The increasing number of house prices and rentals are the outcomes of the tourism pressure on the real estate market. Currently, many cities around the globe such as Berlin, Prague, Santa Monica, Hong Kong, Belfast, Venice, Rio de Janeiro, Barcelona, Shanghai, Amsterdam, Palma de Mallorca, Lisbon, Reykjavik and Dubrovnik (Colomb and Novy, 2016b; Milano, 2017b, 2018 in *TRAN Committee Authors, 2018*), have been reported having negative effects from overtourism phenomena.

The psychological capacity describes the capacity of locals to resist crowding. The political capacity relates to administration problems that are not capable to deal with tourism growth diminishing local communities' quality of life. The overtourism phenomenon refers to all groups of issues caused by the high number of visitors – social, physical, economic, and ecological facets. According to research for the TRAN committee (2018) stakeholders identified the following problems: Social, economic and environmental impacts should be assessed more systemically and interdependently, also by taking into account the voice of residents and their understanding of the phenomenon. Academia should bridge the gap between business studies and social sciences perspectives to forge a better understanding of tourism impacts. Tourism impacts should not be seen as a unidirectional phenomenon but as an encounter that is continually changing because of the interaction between tourism and the destination. Postma (2013) suggested the term „critical tourism encounters”. It can be interpreted as one or more thresholds being crossed, resulting in negative effects. Such impacts signify the depopulation of the city centre; protests organized by grassroots movements, loss of heritage and authenticity in different settings. Findings from the TRAN committee study (2018) includes tourism density (bed-nights per km²) and intensity (bed-nights per resident), the share of Airbnb bed capacity of the combined Airbnb and booking.com bed capacity, the share of tourism in regional GDP (Gross Domestic Product), air travel intensity (arrivals by air divided by number of residents) and closeness to the airport, cruise ports and finally, UNESCO World Heritage Sites as relevant indicators for overtourism.

Frey (2021, p. 23) also emphasizes housing issues. There are growing number of issues regarding availability of affordable housing in major urban destinations. The locals more and more struggle to stay in their original communities. Another factor here is closing traditional businesses that were originally focused on serving the needs of nowadays decreasing number of local populations. These causes overall increase of living costs. It includes increase of food and beverage services especially in touristic hotspots where international tourists are main clientele. As a result, growing numbers of local residents are forced to leave inner city areas and relocate to the outskirts. For instance, Venice is the bright example of such changes (Frey (2021, p. 23) considerable number of local dwellers have left the historic city centre; currently just over 50,000 people remained. However, Airbnb rentals offerings has increased significantly. The problem here is in unequal distribution of income as the number of individual real estate owners offering several apartments has increased noticeably.

The drivers of the overtourism are specific to urban, rural and coastal areas as much as to islands, attractions and heritage sites. To date, most studies have focused on causes and drivers, mostly in urban settings. According to a study on Managing Tourism Growth in Europe (Jordan et al., 2018) overtourism can be induced on one hand by the accessibility and affordability of travel and as a consequence the increase in international arrivals, the proliferation of unregulated tourist accommodations, and the concentration of large groups of tourists in certain places of the cities in concern and by the gentrification and increasing prices in city centres and new neighbourhoods, the traditional policy focused on promoting the increase of the volume of the cities and the urbanisation pressure in general on the other hand. Equally, according to the same study, the overtourism consequences of tourism growth might also be identified as the threshold which may cause overtourism. Some of them may be related to the frustration of those who live in a host destination, which can result from: the increased congestion, the pollution, the pressure on infrastructure, the environmental degradation, the growth in energy and water demand, the visitors' behaviour, the damage to historical sites and monuments, the loss of identity and authenticity, the increases in living costs for residents, and the increasing inequality among residents' (Jordan et al., 2018).

Milano (2017a, 2018) based on qualitative research in three EU cities, Barcelona (field research), Berlin and Venice (desk research), provides several elements and causes of discontentment for overtourism comprising of the congestion and privatization of public spaces in city centres and the rise in real estate prices leading to the commercial gentrification of urban areas and eventually to the loss of residents' purchasing power. On the other hand, the unbalanced number of inhabitants compared to visitors, for example, due to the increase in cruise ships and high numbers of cruise passengers in a short time, can also result in environmental deterioration, including waste, noise and air or water quality problems.

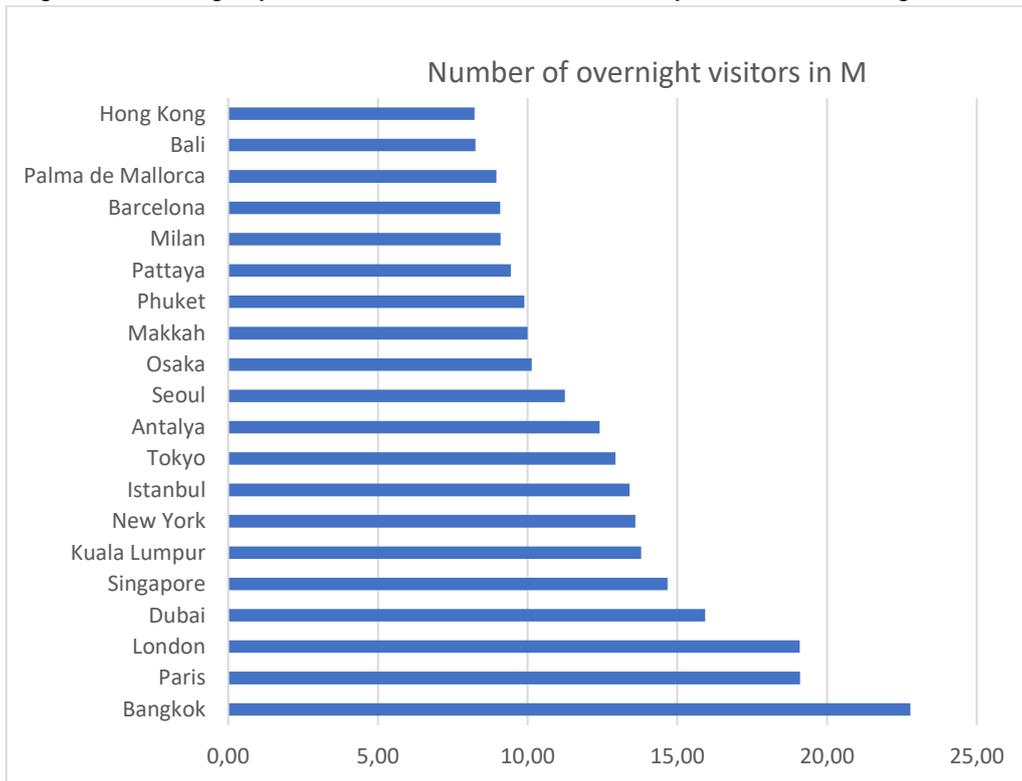
Methodology

This study uses the descriptive research method that describes the characteristics of a phenomenon, namely overtourism. Particularly, the trend is analysed with the help of secondary data available on Eurostat, Statista.com, the Hungarian Statistical Office, and the official website of the Barcelona city council (Barcelona.cat). Barcelona is among global leaders in terms of inbound tourism's. Therefore its practices in sphere of coping with overtourism are valuable for other growing urban destinations. Both Barcelona and Budapest have similar population numbers respectively 1.621 and 1.741 million (Worldometers.info, 2022). According to the research conducted by TravelBird both cities were among top five European cities ranked worst for overtourism. Considering mentioned factors it would be valuable to learn the experiences of Barcelona in order to cope better with growing overtourism in Budapest. Factors such as Overnight stays and Tourism Intensity are compared between two cities, Barcelona and Budapest. Furthermore, a comparison between the cities is provided based on the additional factors causing overtourism. The deficiencies in sustainable tourism planning in Budapest are discussed by comparing factors contributing to overtourism in Barcelona.

Findings

Due to its cultural, built and natural resources, Barcelona became one of the globally well-known hotspots of urban tourism. Undoubtedly, the remarkable architecture and design, and the comparatively high-level service along with tourism placemaking contributed to a great extent to establishing one of the examples of European commodified cities (Milano et al., 2019). Iconic locations such as Sagrada Família, Park Güell and the Montjuïc Fountains; the hotspots such as La Rambla; and neighbourhoods such as La Barceloneta, El Barri Gòtic and El Born became exceptionally popular among tourists. From the below chart it can be observed that Barcelona was among top ten destinations in terms of international overnight visitors - 9.09 millions.

Figure 1. Leading city destinations worldwide in 2018, by number of overnight visitors



Source: (Statista.com)

Below the research results conducted by TravelBird regarding overtourism issues are presented. The chart reveals the worst cities in terms of overtourism in Europe. Cities with smaller score like Barcelona experience more issues in regard to overtourism. The ranking includes factors such as number of accommodation beds (per square kilometer); number of tourists during the peak season compared to number of residents; surveying residents about overcrowding. Considering mentioned indicators, final ranking shows the score that represents the extent of coping with overtourism.

Figure 2. Ranking of the worst cities for over-tourism in Europe in 2017



Source: Statista.com

All this extensive use of territory and facilities caused a decrease in the quality of life for local dwellers (Barcelona Tourism Strategy, 2020). The “Barcelona model” (Delgado, 2007, in Milano, 2019) and related growth in visitor numbers boosted grassroots activism. Such movements evolved into organized resistance with their action programmes demanding stronger regulations of tourism in the city. Particularly, ABTS (an NGO in Barcelona) mobilized the voices of local communities against consumption growth models of tourism development. The central topic of their agenda was suspending real estate speculations parallel with tourism degrowth (Milano et al., 2019). These demonstrations caused a snowball effect in other Mediterranean destinations and concluded as the first Neighbourhood Forum on Tourism organized in Barcelona in 2016. The main agenda was the acknowledgement of overtourism-related issues and bringing together activist groups from Venice, Mallorca, Camp de Tarragona and Malaga. In 2018 the assembly of neighbourhood associations resulted in the establishment of the Southern European Cities against Touristification (SET) network – the expansion of the previous format. The central idea of the convention was to set the goal to promote degrowth and influence policy makers (Milano et al., 2019). The data below show the perception of the local population on incoming tourism. In 2019 around 28 % of the respondents (representative sample) would rather accept degrowth policies to cope with the situation (Tourism Activity Report, 2020).

Table 1. Need for attraction of more tourists. (%)

	2019	2020
Yes	69	64.1
No	27.7	33.3
Don't know	3.3	2.6

Source: Barcelona tourism activity report 2020 (p.158)

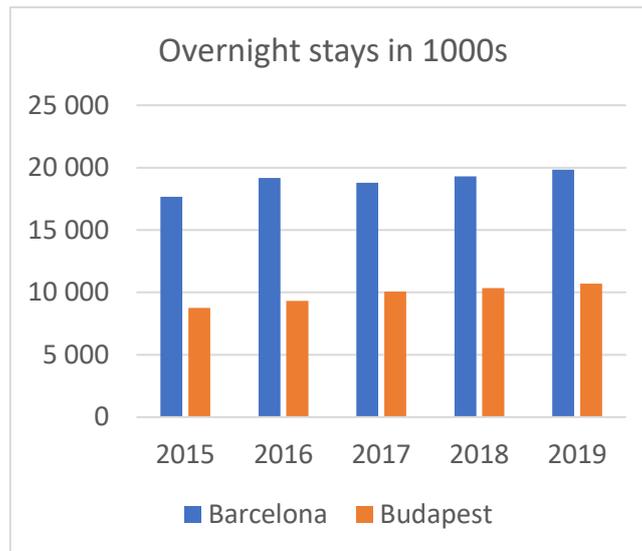
Table 2. Perception regarding the needed degrowth in tourism. (%)

	2019	2020
Yes	27.7	32.5
No	68.3	62.6
Don't know	3.9	4.9

Source: Barcelona tourism activity report 2020 (p.158)

One of the indicators of overtourism is considered to be the number of overnight stays. According to data, we can highlight that before the COVID-19 pandemic there was substantial growth in tourism in Barcelona. Between 2015 and 2019 overnight stays increased by 12,4%. By comparing these figures, we can see that there was a 1.94 million overnight stays increase in Budapest, making a 22% difference for the same period.

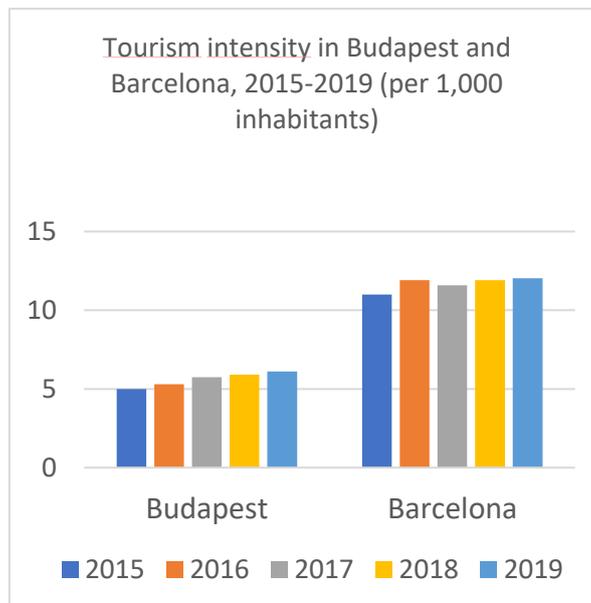
Figure 3. Overnight stays in Barcelona and Budapest, from 2015-2019 (own elaboration)



Source: Statista.com or Hungarian Central Statistical Office (HCSO)

According to Barcelona’s Tourism Activity Report (in Martin et al., 2018) only 50.5% of the visitors stayed in hotels, while the rest of the tourists preferred private apartments that could be booked through services similar to Airbnb. Undoubtedly, this was the main reason behind the increase in the rentals market, thus, during 2015-2016 the average price of the apartment rentals in Barcelona has climbed by 37.2% (Martin et al., 2018). This in turn initiated local activism against tourism growth. One of the indicators of overtourism is the high level of Tourism Intensity which is defined as total overnight stays per resident.

Figure 4. Tourism intensity in Budapest and Barcelona, in 2015-2019 (own elaboration)



Source: Statista.com or HCSO

When we compare overtourism in both mentioned cities, Barcelona has two times higher tourism intensity than Budapest with approximately similar resident numbers, cca. 1.6-1.7 million. It can be concluded that the situation in Budapest is not as advanced as it is in Barcelona, however, some parts

and facilities of the inner city are already suffering from overtourism. The reason behind Barcelona having comparatively more visitors is due to its geographical location and natural assets. The city is on the seashore and is a famous destination for cruise ships. Definitely, cruise ship tourism is one of the main contributors to overcrowding in central areas and main touristic hotspots. Barcelona and its surrounding areas are also popular for sea, sun and sand tourism which is also a factor contributing to the extensive use of the city's resources.

On the other hand, Budapest is famous for its ruin pubs in recent years. These pubs are located in the central area of the historic 7th district which is also called the Jewish district. There are some dilapidated buildings and streets that were abandoned, however, some of them have been revitalized. It started as an individual initiative of placemaking to have them reused temporarily. As time passed, they attracted many entrepreneurs who wanted to outstand from other food and beverage businesses. As a result, initial place-making initiatives became widespread and eventually, mainstream. This in turn brought many international visitors shortly to cause overtourism in the rather densely populated area. This phenomenon already reached its peak before the pandemic. There were organized protests and a district-level referendum on regulating overtourism took place in 2018. According to research (Smith et. al, 2019) residents were complaining about overcrowding, litter, night noise, price increases, street crimes and higher rental prices. In addition, there were overcrowding issues in some centrally located thermal baths, that were even targeted promotion for international tourists.

All these factors contributed to the lessening of the quality of life in the inner part of Budapest. To ease overtourism issues Milano (2019) suggested the 5D Degrowth approach as a preventative measure. It consists of Deseasonalization, Decongestion, Decentralization, Diversification and Deluxe tourism. Below it will be elaborated in the Budapest context.

Conclusion

The elaborated secondary data and the case of Barcelona showed weaknesses in facing overtourism in urban areas. Examples from Budapest illustrated the same problems, although on a smaller scale. Certain solutions for Budapest coming and benefiting from the extensive research on the Barcelona case can be presented. According to the above-mentioned 5D Degrowth approach, Deseasonalization should be applied. Seasonality is not a critical issue in Budapest as it is the case in Barcelona. Budapest boasts of different types of water resources, namely thermal springs, that can be visited all year round. Because of this, the city could be promoted for winter stays, which will help to achieve Deseasonalization. Regarding the 2-4 elements of the approach, it should be mentioned that congestion is the actual problem in the city. Moreover, limited areas of the inner city are frequented by international tourists. On top of that, local dwellers also benefit from recreation in the same areas of the city. Therefore, congestions can be solved with dispersion and diversification of touristic paths within the whole area of the city, as well as building and promoting more facilities outside the central area. According to earlier research, luxury tourism is very much appreciated by a variety of stakeholders of a bigger urban community. In this vein, a higher level of cultural programs and events can contribute to this goal. As the tourism value chain is a complex economic phenomenon, to facilitate the suggested changes governmental support is desired.

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Discussing the fashion rental service and the attitude of the Hungarian population towards clothing rental models

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Abstract

As traditional linear business models collapse and sharing economy thrives, it has become clear that the future of fashion is renting. New clothing rental companies are springing up like mushrooms in societies susceptible to innovative, sustainable solutions, in contrast, in Hungary circular business ideas to the textile industry remain somewhat isolated.

This paper aims to discuss the clothing rental model, more specifically its functions and potential pitfalls, and examines the attitude of the Hungarian population towards this model. No similar scientific research has been conducted in this question; however greener fashion is in the interest of everyone. Apart from synthesizing related literature and analysing secondary data, my methodology consists of primary research, too: I conducted a survey of 360 people, moreover, an interview was done with the founder of an innovative, Netherlands-based clothing rental start-up, the so-called Palanta to answer my research question "Is Hungary ready to introduce the clothing rental model?" The expected result is no due to Hungarian's price-sensitivity (H1) and apprehension from used apparel (H2). In order to further investigate the above question and my hypotheses, and to find the most effective ways of popularizing sustainable dressing, a content creator was interviewed. The aim of this research is to provide support to rental businesses pursuing to expand in Hungary by giving information on already operating fashion rental stores abroad and discovering Hungarians' opinion and the potential problems.

Keywords: sharing economy, sustainable business model, clothing rental, slow fashion, consumer behaviour

Introduction

The textile industry is the second largest polluter in the world, right after the oil industry. Enormous water consumption and water pollution, disproportionately big amount of discarded clothing, greenhouse gas emissions are potential source of concern. Moreover, the apparel industry is renowned for the exploitation of farmers and garment workers and the usage of child labour. There is no doubt that the consumption-oriented, throw-away-society based fast fashion business model is to be blamed. Therefore, the flourish of share economy, is a huge breakthrough in this very field, too. Clothing rentals offer a more circular option for dressing in an increasing number of countries, yet environment-conscious Hungarians still must content themselves with thrifted goods or clothes swapped with acquaintances since sustainable solutions are still unavailable in this country.

Besides discussing the operation of a clothing rental model, this paper presents a case study and illustrates potential pitfalls as well as findings on the attitude of the Hungarian population towards renting apparel. Synthesizing literature and analysing statistical information represent important part of my desk-based research. As part of my primary research, apart from implementation and evaluation of surveys, I interviewed CEO of Palanta, Netherlands-based, online clothing rental start-up. Moreover, I interviewed a content creator to further investigate my research question: "Is Hungary ready to introduce the clothing rental model?". The expected result is no due to Hungarian's price-sensitivity and apprehension from used apparel. The aim of this research is to investigate, what are the biggest hurdles in the expansion of this model, and what are the possible stimulating incentives to foster the potentials. Consequently, this research paper provides useful information particularly for enthusiastic entrepreneurs pursuing to spread this alternative model in Hungary, however, it might be an essential

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tool, too, to emphasize the importance of altering current fashion practices and introducing innovative, sustainable business solutions. Because we all need to dress – but it doesn't matter at what cost.

Sharing economy

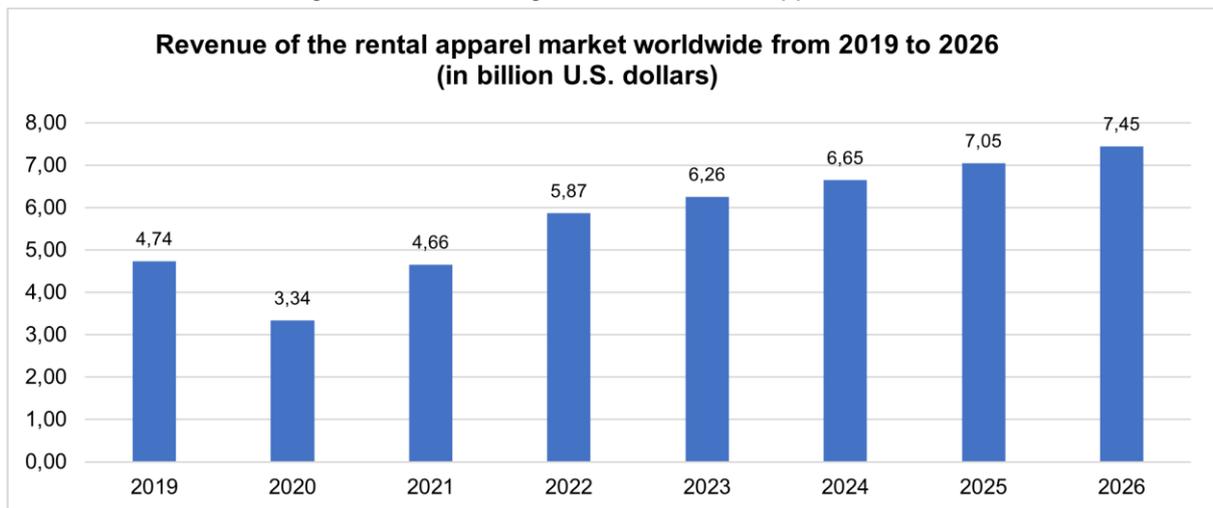
In recent years or probably decades, our attitude towards ownership has changed radically. Any switching of possessing tangible goods to subscribing to services happened unnoticed, raising our lives to a higher standard from several points of view.

The sharing economy is a relatively new economic model also known as a peer-to-peer (P2P) based activity of obtaining, providing, or sharing access to goods and services that is often facilitated by a community-based online platform. Other names for this phenomenon include gig economy, platform economy, access economy, and collaborative consumption. The basis of this model is to make money from idle, underused assets e.g., parked cars and spare bedrooms. In this way, physical goods are shared as services. For example, car sharing services like Uber can illustrate this. "Data shows that private vehicles go unused for 95 per cent of their lifetime. Together with the fact that there are fewer requirements to drive for Lyft, Ola and Uber than for a taxi company means greater supply of rides. Prices of shared services are also falling as indicated by Airbnb rates that are between 30 and 60 per cent cheaper than hotel rates around the world (Yaraghi et al., 2017)."

The sharing economy is a constantly evolving model that – according to expertise - will inevitably become a major part of the global economy. "The sharing economy is estimated to grow from \$14 billion in 2014 to \$335 billion by 2025. This estimate is based on the rapid growth of Uber and Airbnb as indicative (Yaraghi et al., 2017)." The PwC report from 2014 disaggregates this growth across sectors. The predicted growth rate from the shared economy is significantly higher in sectors such as crowdfunding, online staffing, P2P accommodation, car sharing, music, and video streaming. The growth projections are, on the other hand, lower in traditional sectors such as equipment, cars, and DVD rentals (PricewaterhouseCoopers, 2015).

The apparel industry is no different. In the next five year, the revenue of the rental apparel market worldwide was predicted to increase steadily. The revenue of the rental apparel market worldwide was forecasted to increase to approximately seven and a half billion U.S. dollars by 2026.

Figure 1. Predicted growth of the rental apparel market.



Source: Smith, 2022 (Statista)

Clothing rental models

Due to consumers becoming more and more conscious, both financially and from an environmental sustainability perspective, there is a growing demand for sustainable business models. Sharing economy operates well in several sectors but could this alternative model work in the field of fashion, too? If yes, how?

In the fashion industry, the sharing economy means activities like swapping, renting and resale. With these methods, the life cycle of clothes can be expanded by accessing already existing products instead of purchasing new ones. This model can solve the problem of consumerism: generally, we accumulate twice as many clothing as our grandmothers used to. Clothing production has approximately doubled in the last 15 years, while the average number of times a garment is worn has decreased by 36%. On the other hand, extending the life of garments by 9 extra months of active use would reduce carbon, water, and waste footprints by around 20-30% each (Palanta, 2022).

Expanding the use of a product is great, however, sustainable clothing needs to fulfil other criteria, too. Organic or circular materials, fair wages, healthy working conditions are important factors, too. Nowadays, more and more brands play a part in the sharing economy. Their vision is clear: providing an alternative to destructive fast fashion. However, some rentals' product palette still does not comply with the above criteria and consists of unsustainable assortment, built in a sustainable economic model. Moreover, at the present time, fashion companies cannot be 100% sustainable. Local air pollutants and greenhouse gas emissions from last mile deliveries, by-products of cleaning process are those issues that are needed to be solved, even by the most sustainable rental companies.

The below table aims to compare fashion rentals of different profile. There is no doubt that measured by the given criteria, company Palanta is the most sustainable. (Palanta is further elaborated in 3.1.) Nuuly is intent on becoming more sustainable by providing more and more upcycled options. Rent the Runway (hereinafter RTR) has sustainable ambitions, too, but not to a satisfactory extent.

Table 1. Comparison of different fashion rentals

	RENT THE RUNWAY	PALANTA	NUULY
collections	designer clothes for women + children	women's, maternity, and baby	women's (fast fashion items)
location	USA	the Netherlands only	USA
return	4 or 8-day reservation membership: 1 month	after 2 weeks, in case of membership / baby collection: 1 month	after 1 month
price of subscription	\$89, 4 items/month \$135, 8 items/month \$199, 16 items/month	women: €50.00, 3 items/ month baby: €40.00, 5 items/ month	\$88, 6 items/month
possibility for purchase	yes	no	yes
extra services	application	repair, eco events, workshops, education via social media	unrentable garments are upcycled
insurance	\$5 rental coverage fee is included	optional, €8, covers €50/per clothing	included
sustainability	<ul style="list-style-type: none"> • organic/circular materials: no data • fair wages: no data • eco-friendly cleaning: yes 	<ul style="list-style-type: none"> • organic/circular materials: yes • fair wages: yes • eco-friendly cleaning: yes • eco-friendly packaging: yes 	<ul style="list-style-type: none"> • organic/circular materials: some styles • fair wages: no data • eco-friendly cleaning: yes¹⁰

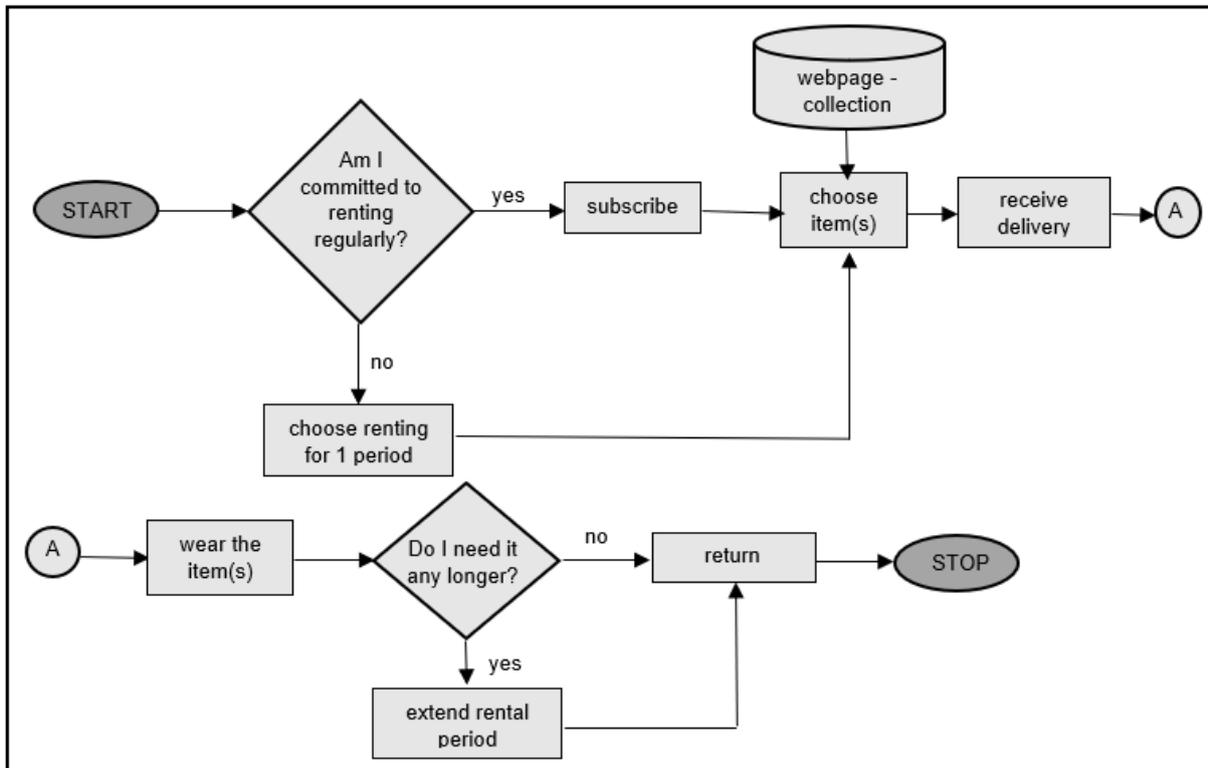
¹⁰ Over 70% is laundered in custom-built water- and energy-efficient wet washing machines + non-alkaline and phosphate-free cleaning solutions (nuuly.com, 2022)

	<ul style="list-style-type: none"> eco-friendly packaging: yes⁸ zero emission delivery: no 	<ul style="list-style-type: none"> zero emission delivery: yes⁹ 	<ul style="list-style-type: none"> eco-friendly packaging: yes¹¹ zero emission delivery: no
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Source: own work based on renttherunway.com, palanta.co, nuuly.com, 2022

The above table shows that there is a huge difference between fashion rental services (hereinafter: FRS-s), yet they function in a very similar way. I created a flowchart to illustrate the renting process from customers' point of view.

Figure 2. Flowchart illustrating a simplistic clothing rental process



Source: own work

Case study: introducing a circular fashion rental and interview with founder Sára Dévényi

Palanta is an online sustainable fashion rental business providing environmentally conscious garment solutions in three categories: women's, maternity, and baby collection. Ethically and sustainably made clothing can be rented via affordable fashion rental subscriptions on Palanta platform. Apart from renting, Palanta provides education through eco-events, workshops, educational talks, and social-media presence: "We educate our conscious community about the ugly truth behind fast fashion and stimulate them to take a step towards green fashion." Palanta feels the urge to revolutionize the fashion industry and solve economic, environmental, social, circularity, ethical brands' and consumerism problems. For instance, apart from providing organic materials and improved working conditions, they extend the lifespan of clothes reducing their carbon, water, and waste footprint. They also help ethical brands connect new market segments to grow faster. CEO of Palanta declared the following in connection with the above strategy in Földgömb Online channel: "A single piece of clothing can be used by ten times more people thanks to Palanta. As a result, brands can take ten times more customer feedbacks to

⁸ RTR customers are asked to return plastic coverings because they are reused in form of wood-alternative building material (renttherunway.com, 2022)

⁹ Carbon-neutral delivery method by DPD (palanta.co, 2022)

¹¹ Rental totes are made from post-consumer plastic. (nuuly.com, 2022)

consideration, which supports a more effective product development. Palanta helps brands with marketing and logistics, too. Instead of applying enormous sales, they are asked to upload their items on our webpage, which might generate a higher revenue (Földgömb Online, 2020, 20.30-21.20. minutes).”

The renting process in Palanta consists of 3 steps, covering full circularity:

1. Rent

Palanta provides a wide selection of carefully selected sustainable women, maternity and baby clothes. The selected items are wrapped in compostable bags. To reduce last-mile delivery problems to a minimum, shipping is maintained via carbon-neutral delivery method by DPD. In fact, 81 per cent of people fall outside of traditional size breaks. (Gwilt, 2020) To avoid problems like this, a fitting appointment can be required in The Hague.

2. Use

The rental period starts when costumers are subscribing for an item and lasts for 2 weeks for women and maternity items and 1 month for baby items, until when customers shall return them. Keeping them longer by being deducted a new subscription fee is also possible.

3. Return

At the end of the rental period, the subscribed clothes should be put in the provided packaging and returned to Palanta. The company does a quality check and properly clean the clothes before lending them to further subscribers. Important to note, that as opposed to some rentals like RTR, Palanta operates exclusively as a rental and does not offer purchasing the garments, in order to ensure complete circularity.

Figure 3. How Palanta works.



Source: Palanta, 2021

Sustainable, circular brands often have to operate on a relatively small budget and get stuck in the introduction stage. The aim of Palanta is to collaborate with these brands, expand the rental model with a growing number of ethical solutions, and support circular fashion businesses. Up to +160% of their wholesale revenue can be earned if products are shared instead of discounted or discarded. After each rental, a commission is earned. Moreover, participating in marketing campaigns and eco projects helps to increase brand awareness. (palanta.co, 2022)

Palanta set the below requirements for brands aspiring to join:

- Transparency
- Ethically paid workers
- Organic, upcycled or recycled materials
- Use of pictures for social media presence

I interviewed Sára Dévényi, founder and CEO of Palanta to get primary information about FRS, and to complete statistics and literature. Firstly, she elaborated on their collaborations. Apart from the above criteria, brands with a special motivation or story are warmly welcomed. Cooperation is preceded by Zoom meetings where management is got to know in order to make the best decision when choosing partners.

Secondly, the topic was the market. Ms. Dévényi characterized the Netherlands a quite receptive population, but overall Europe is now in pursuit of entering the FRS business. Thus, Palanta is facing a growing concurrence. Their unique selling proposition is that only sustainable brands can be rented. Palanta endeavours to satisfy Hungarian and Austrian eco-conscious fashionistas too in the near future, however their Hungarian opening is still some way off despite their growing success in the North. The Hungarian and the Dutch fashion industry differ vastly in financial terms. As for market segmentation, their subscribers consist greatly of 25-30-year-old urban women. However, instead of sociodemographic data, interest plays a more important factor when deciding the company's market target. For instance, there is a greater chance for a marketing campaign to succeed if Palanta is advertised among vegans or those interested in yoga.

Finally, we discussed the potential cause of the relative unpopularity of slow fashion compared to fast fashion. Ms Dévényi named the following reasons: desire to possess and misconceptions about prestige and status symbols. Slow fashion is a special subject that works only when costumers break up with the hustle and bustle and slow down. Mindfulness is a requirement to be able to appreciate and value sustainability. Another reason why slow fashion cannot displace fast fashion is inefficient communication and education. Apart from people coming from the so-called sustainable bubble, environmentally conscious models, businesses, and ideas in general still remain somewhat isolated. Hence, further research should be conducted to investigate, what are the most effective tools to convince consumers to switch fast fashion for slow fashion. (Dévényi-Lengyel, 2021)

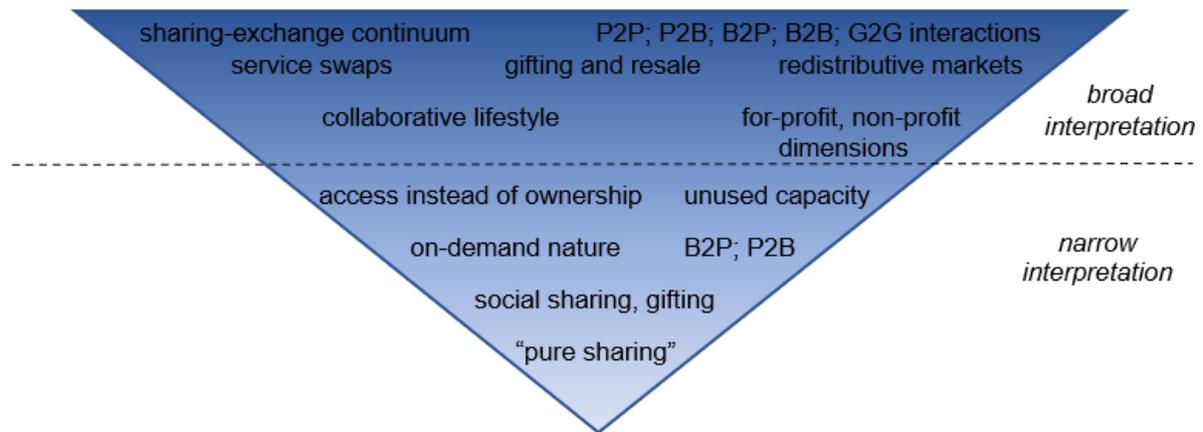
Potential problems

Dilemmas of defining the sharing economy

According to research papers discussing the problems of sharing economy, several legal disputes were caused by the misuse of the term. People misunderstood the concept and started to use it as an umbrella term for platform-based solutions due to positive interpretation of the phenomenon and customers' growing willingness to share.

Belk defines sharing as an activity and process when we offer to share our possessions and/or we are offered someone's possessions, without compensation, giving us the impression of mutual ownership. On the other hand, pseudo-sharing a.k.a. collaborative access is derived in economic interest and is based on the higher-degree utilization of resources (Dudás et al., 2019).

Figure 4. Narrow and broad interpretation of sharing economy



Source: own work based on Habibi et al., 2016

The sharing economy is still a grey area: not even liberal states have established a legal framework to regulate it. Consequently, several sharing platforms have been banned in many countries. In Hungary, e.g., the car-sharing giant, Uber, has been banned: costumers used it as taxi, instead of for the better use of underutilized goods. It was not only the costs of use that were shared but they were engaged in economic activity, endangering the work of taxi drivers. The main task for the legislators in the coming period is therefore to create a legal framework that simplifies participation in the sharing economy compared to the rules governing the economic activity of businesses, but still provides sufficient guarantee to protect the interest of those involved. In the future, participants in the sharing economy will not be purely consumers or businesses, but must be given a well-defined new status (Környei, 2016).

What if fast fashion stores worried about the loss of profit demanded a ban on FRS? Just like taxi drivers did with Uber in Hungary. We cannot let this happen legal regulations are urgent, even if it questions the object of regulation.

However, unlike Airbnb, which links users with a marketplace of third-party controlled commodities, allowing customers to monetise their own underutilized assets, a fashion rental firm must purchase and own all the stock that can be rented out. Fashion rental services also face greater logistical challenges. Uber and Airbnb are software programmes. On the other hand, fashion deals in products that are more difficult to transfer between users and require maintenance— such as laundering and repair — between two uses, which is extra cost. RTR has invested heavily in logistics, to guarantee that clothes returned in the morning can be ready to use that evening. However, P2P rental services that allow consumers to borrow from each other has specific difficulties: attracting enough individuals to the marketplace, providing adequate inventory, especially in terms of hygiene and sizes. (Pike, 2016)

Renting in the fast fashion model

Before elaborating on this idea, let me introduce the term “greenwashing”. TerraChoice defines greenwashing as “the act of misleading consumers regarding the environmental practices of a company or the environmental performance and positive communication about environmental performance”. Companies that pursue greenwashing generally spend more money on advertising than on actual environmental consciousness (TerraChoice, 2010; Lexiq, 2021).

In 2019 the Swedish multinational clothing company H&M announced their intention to enter the rental market. Their rentable collection consists primarily of casual dresses designed for weddings and festive gatherings and has been available only at Stockholm’s central square yet, for those customers who have joined the corporate loyalty program. The renting costs 350 Swedish kronor (11,000 HUF/ \$37) per item. In return, several services are provided within the store, e.g.: tailoring, beauty salon, café etc. to enhance the attractiveness of this business model (Bain, 2019).

Nowadays, more and more fast fashion brands expand their profile and set foot in rental business. Urban Outfitters is one of the best-known companies operating a rental section. The criticism of this system

concerns fast fashion attributes. Sustainable economic model to the second least sustainable industry is rather controversial, just like eco collections launched by companies that are entirely based on Bangladesh poor working conditions and exploitative production. It is all about greenwashing. However, it will be interesting to investigate how different consumption values are affected by the image of an original brand or factors such as price or style as fast-fashion brands enter the FRS market, which is currently monopolized by luxury and designer brand merchandise (Gaek et al., 2021). Moreover, drawing attention to this phenomenon, and educating the population might be beneficial, too, however a holistic approach to this problem is not provided. A study published by a Finnish scientific journal 'Environmental Research Letters' found that renting clothes had higher climate impact than discarding them. Delivery and packaging costs were found to be the most significant environmental costs due to a large amount of transportation, taking the clothes back and forth between the warehouse and the renter. A report by the World Economic Forum 2021 suggested that the industry is responsible for 5% of global emissions. Moreover, dry cleaning also poses a potential threat to the environment (Elan, 2021.) I partly agree with this study: renting clothes – especially fast fashion items – is far from providing a perfect, zero emission, zero waste etc. solution to fast fashion. Although, sustainable rentals like Palanta do revolutionize current practices. Collaborating with EU-based sustainable brands designing clothes from organic or circular materials, using smart packaging and environmentally friendly detergents are aspirations that reduce our ecological footprint. An increasing number of rentals dry clean in a PERC-free solution, but water-efficient, phosphate free cleaning solutions are also widely used. With the advance of technology and the wider use of green modes of transportation, the caused harms can be further eliminated.

Illegal renting A.K.A. “wardrobing”

Consumerism leads to destructive habits. Nowadays, it is often considered awkward to wear the same shirt or jumper more than once on social media. Hence, developed the term “wardrobing” (which is a form of illegal renting”). According to a survey published by Checkpoint Systems, one-fifth of shoppers admittedly buy garments with the intention of returning them after short-term usage, costing UK retailers an estimated £1.5bn. The study indicates that “wardrobing” is a growing phenomenon, especially among 16-24 and 25-34 years old. Clothing is the most “wardrobed” item, followed by electronics and shoes (Whelan, 2019).

Yuan and Shen published a study about illegal renting behaviour. “We find that when the customer valuation is sufficiently low, customers would not purchase anything; when the customer valuation is increasing, customers will change the behaviour from renting the product to illegally rent; when the customer valuation is sufficiently large, customers would purchase the product. Moreover, our analytical results show that customers are not willing to return the products if the cost of product returns is sufficiently high, and also are not willing to rent if the rental fee is too expensive. To decrease the illegal renting behaviour, the firm can increase the cost of product returns. Last but not least, we identify that the retailer, the renter and the entire retail system could perform better when the renter and retailer are integrated into one group (Yuan et al., 2019, p.185).”

Hungary and sharing economy

Sharing economy was born in the United States, therefore, it is still the most popular here, however, it has been introduced to Hungarian consumers, too. In 2019, 40 P2P online platforms existed in 5 different sectors: transportation, space sharing, human resource, finance and commerce. The most popular platforms were Bolt, Airbnb, Drivenow, Blablacar. (Imre, 2021) According to a study published by the European Commission, Hungary belongs to the group of EU countries where income generated from sharing economy compared to national GDP is 0,16%. In point of employment, Hungary performed beneath the average. Sharing economy employed only 0,08% of employee. The state of development is different in the sectors: compared to finance and online facilities, transportation and accommodation service providing platforms are developed and well-known. The document, using European Commission’s official definition of sharing economy, identified 15 platforms in Hungary, 7 of them were of international origin (Imre, 2021).

Currently no apparel related business operates in Hungary that is based on sharing economy, except for Neatly, who adapts sharing economy model in laundry and ironing. Thus, the FRS has many unexploited potentials in this Central European country. But is the Hungarian population ready for a shared wardrobe? The expected result is no due to Hungarian’s price-sensitivity (H1) and apprehension

from used apparel (H2). To investigate my research question and the above hypotheses, let me elaborate on Hungarians' price sensitivity in connection with clothing and their attitude towards used apparel.

As the first part of my primary research, I conducted a survey. The form of my questionnaire was Microsoft Forms. I published the questionnaire on social media, more specifically in Facebook groups. A total of 360 submissions were received. Based on gender distribution among respondents, female respondents were over-represented: 91% were women, which is in line with what Brough discovered: there is a kind of psychological relationship between sustainability and femininity. Men tend to avoid eco-friendly behaviors and lifestyles because they are afraid that they would be judged feminine (Gazzola et al., 2020). 43% of respondents were under the age of 26, i.e., born in Generation Z, and 31% belongs to the next generation (Gen Y). Previous research has shown that the younger generation tends to change their habits to protect the environment, but this behavior is partly the consequence of social pressure and fashion, not an intrinsic urge (Kertész, 2020). Further empirical research has revealed that Generation X is most affected by climate change and their sustainability efforts are largely due to this (Papadopoulou et al., 2021). One third lives in the capital city, 41% lives in towns. 50% of respondents have a high school or university degree, 40% have graduated from secondary school. At its own discretion, the vast majority has good or acceptable financial situation. Important to note, that this is a non-representative sample.

I created a tabulation and used filters to see what proportion of the sample could be a potential target market of FRS.

Filters:

- gender: woman
- age: Gen Z and Gen Y
- place of living: capital city
- financial status: good or exceptionally good
-

Table 2. Tabulation about the potential target market of FRS in my sample.

Would you rent clothes for everyday use?	
yes, frequently	5 people
yes, occasionally	24 people
never	21 people

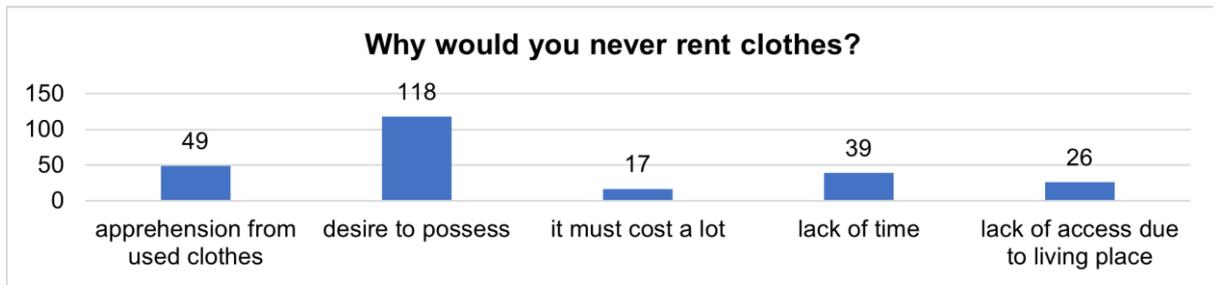
Source: own work

Since nearly every rental is specialized on women, this filter is unequivocal. The above research justifies the age choice. The CEO of Palanta said that their target market consists of urban women, so I decided for Budapest only. Looking at the price tags and subscription fees, good or exceptionally good financial situation is required. This sample is non-representative, so issuing the survey to a wider audience would have given a more appropriate result. But still, only a small proportion is open for the introduction of clothing rentals.

But how can this hostile attitude be explained? I investigated the issue from Hungarians' price-sensitivity (H1) and apprehension from used apparel (H2) point of view.

But before eliminating on these findings, examine general answers. Overall, 23 people would rent on a regular basis, 183 people occasionally and 154 people responded never. This hostile behaviour can be traced back to several reasons:

Figure 5. Respondents reason to not renting clothes.



Source: own work

Respondents interested in renting were inquired about their interests to test CEO of Palanta's theory about the sustainable bubble. The most popular topic was environmental protection followed by healthy lifestyle and animal welfare. Veganism, yoga, spirituality, and mindfulness were particularly popular topics, too.

According to my sample, the following characteristics and extra services are expected from a sustainable rental business:

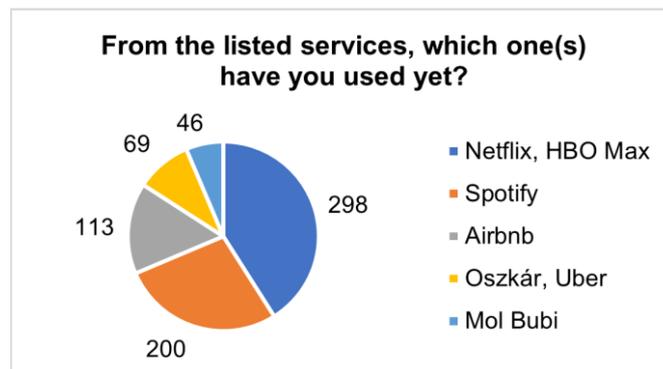
- | | |
|--------------------------------------|-----|
| 1. possibility to try clothes on | 290 |
| 2. eco-friendly cleaning methods | 261 |
| 3. sustainable, ethical brands | 253 |
| 4. insurance | 183 |
| 5. social media presence | 131 |
| 6. style advice | 123 |
| 7. CO ₂ -neutral delivery | 116 |
| 8. educational materials | 68 |
| 9. workshops, events | 57 |

The necessity to try on clothes is huge. It is not surprising if the data about people falling out of traditional size breaks are taken into consideration. However, if a platform-based rental business is concerned, this is hardly feasible. RTR eliminates size problems by sending 2 different sizes of the rented items. At Palanta's, customers can sign up for a fitting appointment. Which process could work best for Hungarian customers, should be the subject of further research.

The issue of cleaning is discussed in section 5.2.

Respondents were asked about the preferred renting period, too. Nearly every second filler responded that renting for a whole season would be the most ideal for them. Compared to existing FRS strategies, where normal renting is 2 weeks and subscription allows to permanently own an item for 1 month, a season is an irrational period. However, from practical point of view, different items would require different renting periods: maternity clothes, coats should be ideally rented for months, while dresses for an event or vacation or baby clothes for a week or two. Currently, an expansive strategy regulating this problem is inconceivable for me.

Figure 6. Used P2P platforms.



Source: own work

The general popularity of peer-to-peer platform operating services are significant in my sample too. Film and music streaming are by far the most popular services, but other options were selected by many respondents as well. Personally, I hope, that after a couple years, this list will be expanded with FRS options, too. In the next chapters, I am examining, how likely it is in the near future.

Hungarians' price sensitivity in connection with clothing

According to a study representative of the Hungarian population aged 18-79 by gender, age, education, and region, in 2020, consumers have bought mostly clothing products online (39%), 29% of which were ordered from foreign webshops (Reacty Digital, 2021).

Central Statistical Office (=KSH) provides further details about Hungarian clothing habits. The data applies to financial year 2019. Textile, clothing and footwear retail sale amounts 6,1% of total retail sale which is 4,9% more compared to the previous year and nearly 30% more compared to 2015. This growth is represented in the abundance of clothing specialty shops, too: there were on average 23 textile-, clothing-, and footwear shops in a common shopping centre. This is the double of book and IT-stores and approximately five times of food- and grocery stores. Average monthly consumption expenditure of households table shows that in Hungary 4 265 HUF was spent on clothing and footwear per capita (KSH, 2020).

According to Eurostat, in Hungary the clothing and footwear expenditures are low: between 2005-2014 household final consumption expenditures compared to gross domestic product were the lowest in the EU. Portugal, Italy, Estonia spent more than twice on apparel. In 2013 we could overtake Bulgaria and Check-Republic and fall into line with Romania. Stores with the highest income were Decathlon, H&M, Deichmann, C&A, New Yorker, Zara, CCC, Szinga Sport, Hervis, Háda, LPP Hungary, Takko, Orsay, Sportsdirect and Peek&Cloppenburg (in 2017). The current trends were generated by fast fashion: this list confirms that Hungarian costumers prefer fast fashion. Only one of the above stores offer second-hand clothing. The total revenue of the above 15 company grew by 70% within 5 years, and their total profit eight times (Fabók, 2018; Parlament, 2020).

From sustainable clothing point of view the most important factor for Hungarian customers are quality, the second is price and third is design. Several research confirmed that Hungarians are price sensitive. Besides value for money, only 17% are able to take premium quality, Hungarian origin and fair-trade production into account. However, according to a survey specifically related to sustainable fashion, 71% of Hungarians would be willing to pay more for a piece of clothing if they knew it was made under sustainable conditions (Mengyán, 2020).

From fashion rental point of view, my results were not as promising. Half of the respondents would pay less than 5000 Forints (12,5 USD) for the rental of a singular sustainable item. However, this price is way too low compared to international rental business tariffs. 23% could afford 5-10 thousand HUF for the same category, and only 11 people would be willing to pay between 10-30 thousand Forints (25-75 USD). These data are quite surprising if we look at diagram 2. Only a small fraction of people conceives that renting costs too much. Certainly, price is a subjective topic. Renting a sustainable piece of clothing might cost more than buying a fast fashion item. Purchasing sustainable clothes can cost approximately 10 times more than fast fashion clothes. (Földgömb Online, 2020) However, these costs can be reduced by renting. We can try out costly pieces without buying them, and also stop worrying about its environmental impacts because renting stimulates circularity. Regardless of the debate surrounding wrong or correct definition of sharing economy and economic interest, the popularity of services like Airbnb and Uber are originated mostly in the possibility of saving money.

Table 3. Frequent fast fashion and designer consumers' spending willingness who require a constantly changing wardrobe

rental period	
1 season	18 people
under \$12,5	11
\$12,5 - \$25	7
1 month	6 people
under \$12,5	5
\$12,5 - \$25	1
2 weeks	10 people
under \$12,5	3
\$12,5 - \$25	5
\$50 - \$75	2
1 week	6 people
under \$12,5	5
\$12,5 - \$25	1
Total	40 people

Source: own work

Clothing rentals, on the other hand, provide a cheaper alternative only for those who spend enormous amounts of money, e.g., those who prefer designer brands or sustainable brands. Unfortunately, these people belong to the minority among my respondents: nearly 80% shops in fast fashion stores. To reduce the impact of fashion to a minimum, fast fashion addicts should switch to renting. Frequent fast fashion shoppers (who buy a piece every month or more often) who require a constantly changing wardrobe (4 or 5 on a scale of 1 to 5) can be another ideal target market of FRS. How much would these respondents pay? It is illustrated by the tabulation on the right hand side.

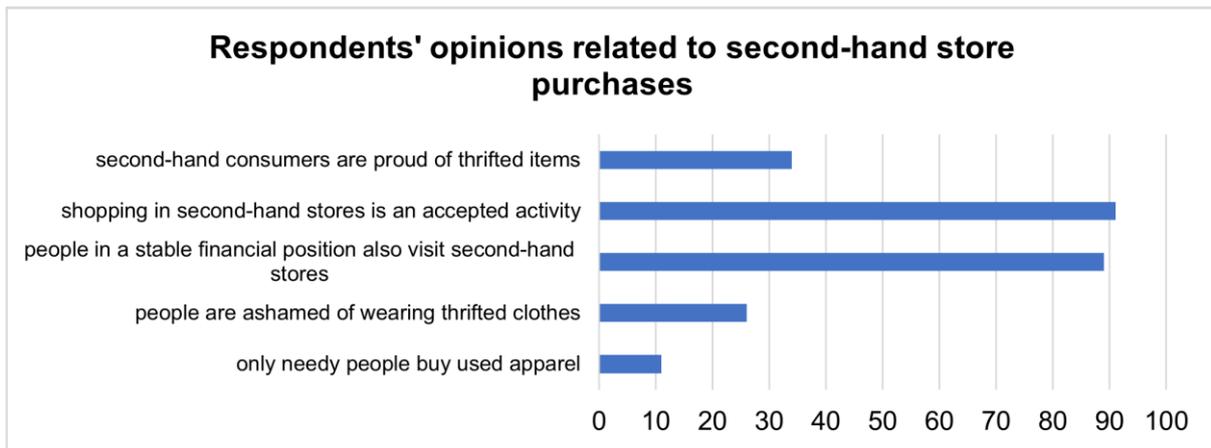
Hungarians' attitude toward second-hand clothes

The value of the second-hand clothes imported to Hungary is 74,2 million USD. With this amount, our country is the fifth biggest importer (Tóth, 2020).

In the last few decades, the retail of second-hand apparels is increasing. Besides international trends, the demand for used apparel is growing among middle income consumers and younger generations, too. The majority of the market consists of women. It is important to emphasize that there is no connection between other socio-demographic characteristics of customers (income, level of education, age) and customer behaviour relationship, i.e., buyers with quite different social and income statuses appear among customers of second-hand clothing stores, too. Before the regime change, used apparel was considered the symbol of poverty, consequently the populace was averse to it. Nowadays, the prejudice occurs rarely. The shopping of used apparel can be motivated by social, environmental, ethical aspects so sustainability is a growing incentive. However, the most common motivation is sparing and the demand for unique clothes (Várnai, 2018).

An unrepresentative survey introduces customer opinion about second-hand clothing.

Figure7. Opinion about used apparel



Source: own work based on Várnai, 2018

In Hungary, the territorial distribution of second-hand clothing chains shows significant regional differences. Háda's market coverage is the most significant, however most of its stores are located in the country. Háda adjusts its sales strategy to the size of the settlement. Cream and Humana are also getting more attention, yet they can be found mostly in the capital and are built on piece price and falling price strategies. In the next few years, the spread of vintage stores is expected (Várnai, 2018).

To further investigate these finding, I examined my sample too. The results are supporting Várnai's research. 36% buys used apparel on a regular basis, 71% of whom would rent clothes occasionally or regularly. Projected to all respondents, the willingness is lower: 57%. Consequently, people purchasing second-hand clothes are more open to renting solutions than those who obtain their clothing from somewhere else.

On the other hand, I received several feedbacks regarding cleanness of rented apparel. Many respondents expressed their worry about hygiene and the quick deterioration of items. In case of shoes, it is even unhealthy to rent due to several orthopaedic and ergonomic factors, e.g., dilatation.

The results are similar if we take respondents into account who have already tried traditional clothing rentals. 38% has already rented clothes (conceivably for formal gatherings and occasions). The satisfaction rate on a scale of 1 to 5 in connection with the service was 4.38 on average. 65% of them would continue renting occasionally or on a regular basis. This proportion is higher than the percentage of possible renters from the whole sample.

The correlation between willingness to rent clothes and the status whether respondents have already rented apparel or not was further examined with Chi-square test.

Null Hypothesis: There is no significant association between respondents' willingness to rent and their status whether they have tried renting.

Alternative Hypothesis: There is a significant association between respondents' willingness to rent and their status whether they have tried renting.

Table 4. Chi-square test

	Willingness to rent clothes			Total
	frequently	occasionally	never	
Respondents who have already rented				
Observed values	81	8	48	137
Expected values	69,64	8,75	58,61	137,00
Respondents who have not rented yet				
Observed values	102	15	106	223
Expected values	113,36	14,25	58,61	223,00
Total				
Observed values	183	23	154	360
Expected values	183,00	23,00	154,00	360,00

Source: own work

If these values are entered into the Pearson Chi-square statistics, the value obtained is 3,876E-10. In conclusion, evidence from the sample shows that there is a significant association between respondents' willingness to rent clothes and their status whether they have tried renting previously.

Possible solutions

The above results show that the Hungarians' attitude towards clothing rentals could have been more positive. This situation can be most effectively remedied via social media. Fashion trends are mostly led by influencers, and they also impact customer purchase decision. Therefore, influencer marketing should be considered as one of the methods to increase environment consciousness and popularize renting. It is shown that social media influencers have a positive impact on spreading awareness for ethical fashion. According to statistics (We are social, 2021), the number of citizens on social media has increased by more than 400 million over the past 12 months to reach 4.55 billion in October 2021 and the number of users is further increasing. Since a large number of consumers are present in the virtual space, it becomes quite efficient to reach and influence them for sustainable fashion (Khurana et al., 2021).

The affection of influencer marketing on my sample is, however, relatively low. On a scale of 1 to 5, respondents' clothing decisions are influenced by influencers on average 2.17. The variance is 1,17.

95% of the fillers are open to environmental topics on social media, yet 44% meets such posts seldom. It would be interesting to see the level of activity and engagement that the remaining 51% who admittedly follows eco accounts show. To which percent are they truly influenced by these posts?

Furthermore, I interviewed a YouTuber, Instagram celebrity, Fónagy Kitti Márta. She was asked about influencers' responsibility, collaborations with sustainable brand, and the most effective means of online persuasion in connection with fashion. The interviewed content creator represents the younger generation who lives mostly in the capital city or Székesfehérvár. Her target group consists of 18-25 years-olds. 66% of her followers are women.

Mrs Fónagy said that the current influencer world is based on overconsumption. Hauls are held regularly, and items are rarely worn in photos more than once, contributing to excessive consumption of fashion. Influencers can promote green clothing to the tune of a photo or a vlog, but influencer marketing functions best if it is based on real example set. The most effective means of online persuasion is therefore to provide a good example via social media. If users meet photos, stories and videos where eco-friendly activities and products are promoted, it has an increased chance that they will embrace (consciously or subconsciously) such activities and products in their personal lives, too. Mrs Fónagy was interviewed about green collaborations as well. She has experience in such field: she has collaborated with a jewellery store that plants a tree after every purchase or businesses that offer biodegradable phone cases. Up to this day, these collaborations have not been structured. Brands take only the influencers' fame into consideration: they decide on collaborators based on engagement rate

and number of followers. How authentic and genuine an influencer really is, still not a criterion. (Fónagy-Lengyel, 2022)

Conclusion

Sharing economy is a growing business in all fields. The clothing industry is no exception: the profit derived from renting is expected to almost double in the next 4-5 years. As a result, FRS are springing up like mushrooms. They are growing and expanding abroad, but I have become aware of clothing rentals pursuing to enter the Hungarian market, too. But does this model have a *raison d'être* in Central Europe? I examined the issue from two perspectives: Hungarians' price sensitivity and apprehension from used apparel.

This nation spends very little on fashion, even in comparison with other EU members. The highest proportion purchases fast fashion items, so costly subscription fees of sustainable items might frighten off many. Most respondents would not be willing to pay more than 5 000 Forints (12,5 USD) for the rental of an item. The popularity of other platform-based services like Uber and Airbnb lies in the inexpensiveness, so rentals should (re)consider their fees if they aim to reach a broader audience. The stigma around second-hand clothes faded which appears in my sample, too, however, proper hygiene is one sticking point for respondents. Moreover, the desire to possess is a bigger deterrent than I thought. Summarizing my hypotheses, scientific research and my questionnaire proves H1, but H2 is not proved fully.

Apart from the above findings, other problematic issues have arisen in this topic, e.g., the lack of legal regulations and misinterpretation of sharing economy, wardrobing, but the sustainability of some rentals is also questionable. Consequently, there is still a lot of work to be done in this area. One of the most effective tools to boost attitude toward clothing rentals is influencer marketing, however this segment has been settled on overconsumption, which would be difficult to alter, moreover, the unstructured collaboration system is another important deficiency.

Although, there are some areas for improvement, and under these circumstances this model might not be suitable for everyone, it is not a negligible factor that rentals provide a relatively sustainable alternative for fashion. Enthusiastic individuals (conceivably coming from the sustainable bubble), dedicated to protecting the environment from the heavy burden of dressing can turn to this option as well. Compared to the retail price of sustainable, ethical fashion items, renting is rather inexpensive. Organising swaps or e.g., buying second-hand items are also better than accumulating fast fashion pieces, yet one of the advantages of the rental model is that with proper strategy and ambitions, it can be easily structured to support sustainability.

Further research should be conducted to investigate how sustainable the clothing rental model truly is, and how would the global supply chain be transformed if this model could displace traditional fast fashion orientation.

This paper is of use for FRS start-ups aiming to gain a foothold in Hungary by providing eco-conscious garment solutions.

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The impact of COVID-19 to the amount of single use plastic: a case study in faculty of International Management and Business Budapest Business School

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Abstract

It is an indisputable fact that plastic plays a crucial role in modern society. It has transformed our daily lives as well as various industries sectors. Nevertheless, the overuse of single-use plastic has caused numerous problems to the global environment and human health due to the toxic substances contained. Given the major concern about this problem, it is critical to set out Sustainable Development Goal 12 (SDG12), ensuring Responsible Consumption and Production in the 2030 Agenda for Sustainable Development. Recently, COVID -19 has provided ideal conditions for the rising use of plastic, exacerbating the situation. In this research, we conducted an in-depth case study in the Faculty of International Management and Business, Budapest Business School to investigate the amount of single-use plastic by students before and during the pandemic. We collected the student's routine data on the usage and recycling of single-use plastic by asking them to fill in the survey with ten Likert- scale and multiple-choice questions. The result of this survey is quantitative evidence of the impact of COVID-19 on the amount of single-use plastic consumed. We found that COVID-19 has substantially increased the procurement and consumption of single-use plastic during the pandemic. Most of the excessive use comes from personal protective equipment such as masks, gloves, and the adjusting habit of home delivery of consumers. The impact of plastic pollution on the environment and human health under short and long-term circumstances is provided thoroughly, revealing major impediments and considering possible solutions to deal with it. Although the convenience of using plastics has dramatically contributed to enhancing our quality of life, it is essential to modify our behavior towards sustainable lifestyles, such as selecting bio-based packaging products. Budapest Business School should maintain sustainability as its priority mission, not only to reduce plastic pollution but to encourage sustainable growth and promote a green environment in the university. Raising students' awareness should also be exaggerated by promoting them to participate in conferences or workshops related to sustainability.

Keywords: Covid pandemic, Single-use plastics, Sustainability, FIMB and BBS, SDG12

Introduction

Humanity has a lot of environmental problems to deal with. One of them is garbage production which affects the whole world, countries, oceans, cities, and individual's daily life. Every minute, one garbage truck of plastic ends up in the ocean. Many calculations infer the fact that by 2050 there will be more plastic in the sea than fish. Countries aim to reduce garbage production to slow down the process, but a lot depends on single plastic production. How can an average person help this problem?

Toxic substances such as styrene and benzene are carcinogenic, which can cause other health problems included in Styrofoam products. Plastics in the environment endanger wildlife both on land and in the ocean. Despite the great harm, young people with busy lives often use disposable plastic a lot in their daily lives to save money and time due to the convenience and popularity of this material. In addition, Covid -19 has recently provided ideal conditions for the rising use of SUP, exacerbating the situation. The solution to this problem has long been a top concern in environmental efforts. For many years, numerous researches have been conducted to investigate how the excessive use of single plastics has impacted our human lives and the natural environment. Covid 19 pandemic, an extraordinary circumstance, stimulated substantial amounts of plastic waste generated. A relationship between the pandemic and SUP waste is provided comprehensively in this context.

We aim (1) to measure the amount of SUP in our case study which is used by students in the FIMB, BBS daily during the pandemic; (2) to determine the purpose of usage, therefore come to conclusion about the uptrend of disposable plastics amount used among people and (3) adopt solutions to tackle

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each factor and evaluate the chance of success. These goals shall be specified based on four primary approaches identify, avoid, substitute, and recycle.

Research methodology

Type of research

A quantitative method is utilized to comprehend the consequences of the COVID-19 dilemma in connection to single-use plastic garbage. By definition, quantitative research is a type of research that explains phenomena by collecting numerical data that are analyzed using mathematically based methods (Sukamolson, 2007). This study is to measure the frequency of SUP consumption before and during COVID 19 by students studying at FIMB, BBS to give the explanation of the uptrend of consumption; therefore, quantitative research is applied. Responses were collected taking place in one week between April 01, 2022, and April 08, 2022. Questionnaires are online written in the Google Form and disseminated through authors' friends. At the end of the survey, there were 93 responses recorded. In order to evaluate how the pandemic impacted on consumption of SUPs, authors raised questions following with multiple choices answered at different times before and during COVID 19:

“How often did you use single-plastic per week?”

“On average, how many times did you order food/ shopping online weekly?”

“How often did you use masks, gloves, face shields weekly?”

“What do you mainly use plastics for?”

“Did you recycle?”

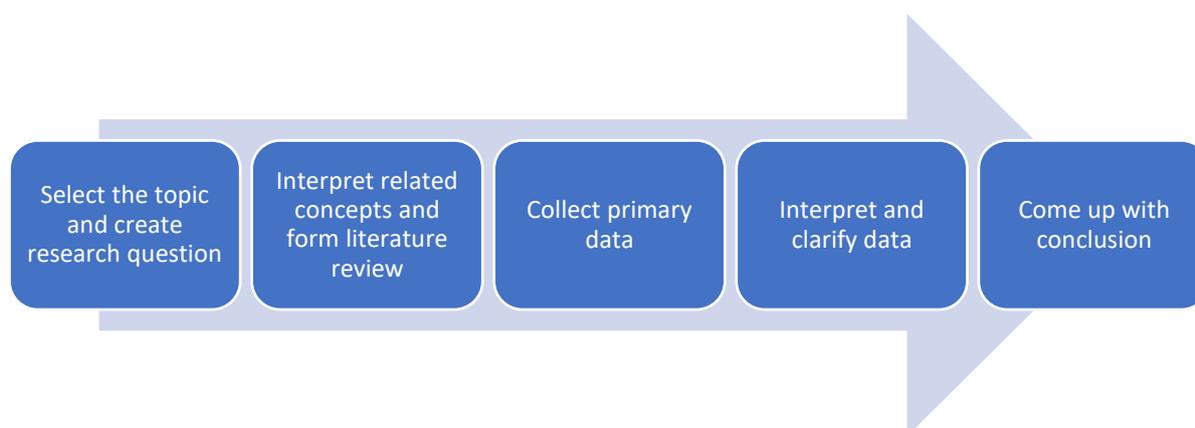
“How has Covid-19 impacted the amount of single-use plastic you use?”

The survey was conducted in early 2022 when the Covid-19 epidemic had not completely ended but gradually stabilized and people lived in the “new normal” with vaccines. At the end of 2019, this infectious disease was discovered in China as Corona, but until March 2020, Hungary recorded its first infection (MTI-Hungary Today, 2020). The difference we want to compare is in the first three months of 2020 and beyond. When a series of policies, continuous changes took place, perhaps creating shocks because they greatly changed people's daily living habits, so that obvious change might leave an impression in mind even though two years have passed. For these reasons, the article chooses an earliest pre-Covid period in 2020 to compare with 2021, when the pandemic is happening. This will make the collected data more precise and reliable, contributing to an accurate assessment.

Research process

Following the early phases of selecting a topic and forming research questions, the research process moves on to the definition of related concepts. The concepts should be explicated in this study including what is SUP and how excessive consumption impacts the environment and human health. This paper emphasizes the negative effects of the overuse of SUP to indicate the urgency and necessity of the topic. The Covid 19 outbreak is also indicated as one of the reasons contributing to the enlargement of single-use plastic garbage. Subsequently, the data were collected from both secondary sources and the survey. Those data were interpreted and visualized with a bunch of pie charts in order to compare the increasing consumption of SUP because of the pandemic.

Figure 1: Steps in the process to conduct the research



Source: Own creation

Thereafter, numerous reasons were investigated as justifications to respond to the expansion of demand for utilizing SUP. Finally, numerous solutions are proposed in terms of individuals and organizations with an aim to raise awareness of protecting the environment towards a sustainable lifestyle and to reduce SUP consumption effectively.

Data collection

Secondary data

Secondary data for this study were gathered from a variety of sources, including prior studies, newspapers, journals, publications, and the World Wide Web. Initially, such data served as the foundation for providing a wide overview of the field of single-use plastic garbage. They help elucidate significantly what kind of plastic is more accessible for study and more relevant in bringing forth the subject's key difficulties.

Primary data

Through a number of answers, primary data were gathered in order to present accurate information about the issues at hand. Questionnaires were implemented because it is an inexpensive method. Respondents are the students having the capability to access the online survey or mobile survey intending to reduce cost. In addition, the population of FIMB students is huge, survey could gather a lot of accurate samples to collect specific results from which to form conclusions.

The selection of students at FIMB, BBS

FIMB is located in district 16, a large rural area surrounding a myriad of trees. Therefore, if the use of SUP is not rigorously limited, the environment nearby the region will be severely harmed. The location of the faculty facilitates organizing activities for sustainability education. Moreover, with more than 350 international students and they are the subjects that the faculty pays close attention to since they will be the messengers who promote the spirit of environmental conservation across the world. For these reasons, choosing such a faculty to give a comprehensive overview concerning the state of plastic garbage caused by Covid 19 and the level of student understanding of sustainability manner.

Literature review

Background information about single-use plastic (SUP)

Humanity is facing many significant challenges in the 21st century, from climate change (Caterina Agrimonti, 2020) to water pollution (René P. Schwarzenbach, 2010), air pollution (Gordon, 1995),

deforestation, and forest degradation. Recently, the SUP has been the major topic of concern with its rapid increase and serious threat to the environment and ocean. In 2015, approximately 6300 Mt of plastic garbage was produced, with roughly 9% being recycled, 12% is incinerated, and 79% being deposited in landfills or the natural environment (Roland Geyer, 2017).

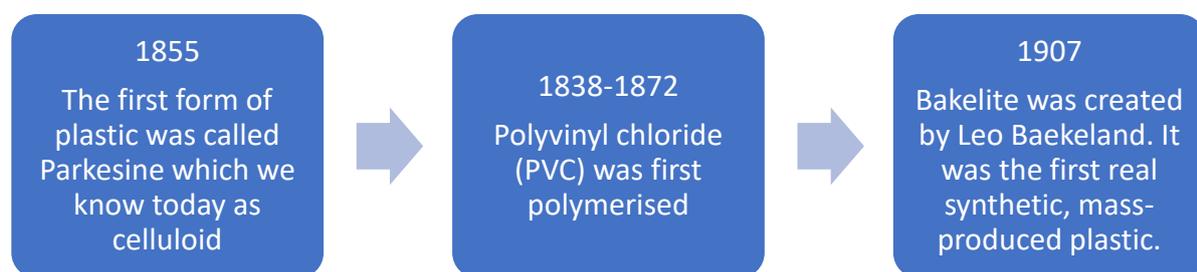
Plastic waste is everywhere and reported from the North Pole to the South Pole, from surface to sediment (David K. A. Barnes, 2009). Plastic packaging for food, drinking, and tobacco items are often used only once, contributing to 61% of global beach waste (Amy L. Brooks, 2018). Plastic packaging and single-use items enter the waste stream after use, contributing to the cumulative accumulation of more than 6.3 billion tons of plastic waste generated worldwide. Only 9% of waste plastic is already being recycled globally. The vast majority of global plastic waste is either landfilled or eventually polluting the environment (80%), resulting in an estimated 4 million to 12 million tons of plastic ending in the oceans annually (LAW, 2015).

Definition and history of SUP

“Simply put, single-use plastic products are products made of plastics, that are meant to be used once, or for a short period of time, before being thrown away.” (Kathrin Graulich, 2021). University is one of the places with a large amount of SUP waste, popularizing thin-film plastic bags, plastic bottles, straws, cups/glasses, etc. Nowadays, students consume a lot of food and drinks products related to single-use plastics, such as plastic bottles, milk teacups, and takeaway coffee. This amount of plastic contributes significantly to society's overall emissions, environmental impact, and ocean impact.

It has been 160 years since the first plastic was invented in the world. In 1862 Alexander Parkes introduced the world's first man-made plastic called “Parkesine” at the London International Exhibition. Since then it went through a lot of changes until it reached its form known today.

Figure 2: The History and Proliferation of SUP



Source: Own creation

However, general manufacturing of plastics did not begin in effect until the end of World War II, with yearly output reaching over 5 million tonnes in the 1950s. Plastics rapidly became popular because of their lightweight, robust, affordable, durable, and corrosion-resistant qualities. Plastics are highly elastic materials that may be used to make various goods, including flexible and stiff objects, adhesives, foams, and fibers. As a result, yearly plastic manufacturing surged dramatically from 30 million tonnes in 1988 to 359 million tonnes in 2018 (Trettnak, 2020).

The effects of SUP

Single-use plastic wastes produce numerous adverse effects on both individuals and the environment. On an individual level, plastic discharged into the environment or buried will be decomposed into millions of tiny plastic pieces of different sizes, such as micro, nano, and pico, which can easily mix with water, soil, and air. Drinking water, breathing the air, and eating food grown from the ground with these harmful plastics can threaten human and sea creatures' health. The waste treatment produces toxic gases: dioxins, furans, etc., which will remarkably affect the endocrine glands, reduce immunity, and even cause cancer. In plastic bags, pure kerosene can be mixed with sulfur and burned with steam to form sulfuric acid, which causes acid rain. Many low-quality plastic products are produced in large quantities, which during use, they will make BPA - a toxic substance and causes many dangerous diseases in humans such as infertility, diabetes, cancer... (Tâp, 2020) On the environmental level, the plastic bags

that mix with the soil will change the physical properties of the soil, cause erosion, make the soil unable to hold water and nutrients, and prevent oxygen from passing through the soil, affecting plant growth. For living species: Plastic waste dumped into the sea can, unfortunately, be eaten by sea creatures. It will destroy or degrade biodiversity, kill marine organisms and reduce the absorption capacity of animal food. When marine creatures ingest additives in plastic, it negatively affects their bodies' endocrine systems and hormone regulation. These aquatic organisms can either die of plastic or become deprived of food because the plastic kills the creatures in their food chain. When caught in discarded fishing nets or other plastic waste, marine animals will not be able to escape so they will weaken and die. In human tourism activities: when the environment is polluted, it can cause a bad impression of tourist destinations, affecting the tourism income of the locality (Tâp, 2020). Impact on human fishing activities: The more organisms die of plastic waste, the less production of seafood catches. Moreover, plastic waste blocking the water intake or getting caught in fishing nets, propellers, etc., can cause equipment damage.

The impact of Covid 19 on the amount of SUP in the world

From 2020 until now, all of humanity has been a struggle with a global pandemic – COVID-19. The World Health Organization has requested a 40% increase in the production of disposable PPE. Suppose the global population adheres to the standard of one disposable mask per day after the blockade is over (WHO, 2020). In that case, the pandemic's global population could lead to monthly global consumption and waste of 129 billion masks and 65 billion gloves. At the peak of the COVID-19 outbreak, hospitals in Wuhan, the core of the disease, generated more than 240 tons of single-use medical waste (such as disposable masks, gloves, and gowns) each day, six times the daily average before the outbreak (Zuo, 2020). If the increase observed in Wuhan holds true elsewhere, the United States could generate an entire year's worth of medical waste in only 2 months (Cutler, 2020). In addition, COVID-19 makes online shopping more popular than ever. The study also reports an increase in online shopping from 12 to 57% in countries like Vietnam, India, China, Italy, and Germany during the same period. A market research firm, Rakuten Intelligence has reported a growth rate higher than 50% compared to 20% year-on-year growth in online shopping in the US from March to mid-April (Rattner, 2020).

The factors lead to the increasing amount of SUP even before the pandemic

The affordable price and short-term convenience of plastic

“\$ 0.50 – 1.50 per kilogram for virgin PET (PET=polyethylene terephthalate), \$ 0.20 – 0.30 per kilogram for recycled PET, and \$ 0.06 – 0.08 per kilogram for mixed plastics” (Poolen, 2016)

Plastic is well-known for its low production costs. It is formed of natural oil and gas, containing cellulose, coal, and salt. As the prices demonstrate, a plastic bottle is far less expensive to manufacture than a glass bottle since it does not weigh as much and does not require a specific thickness. The main reason people and the factories do not recycle more is that manufacturing is so cheap that even recycling is more expensive due to water, electricity, and scrubbing. A plastic bag takes 20 years to decompose, while a plastic bottle takes 450 years. Unfortunately, this problem has existed for centuries, regardless of whether new recycling technologies or sophisticated machinery developed.

One of the primary reasons people prefer plastics is that it is long-lasting and protects against contaminants and the environment. It minimizes food waste by preventing food from spoiling or drying out in a short period. For instance, putting a slice of cheese in the refrigerator might dry up in a day, but if storing it in a plastic box, it will endure at least a week. (Beeson, 2017)

Humans' limited awareness of solid waste management

Humans' limited environmental culture is the most fundamental cause of plastic waste. Human consciousness is still not competent (Vuong, 2021), as evidenced by the preceding relatively common activities nowadays: Overuse of nylon bags and disposable plastic items, specifically in business, due to its low cost and convenience without caring about the non-biodegradable characteristics of plastic. The garbage disposal is arbitrary, not in the appropriate places, and does not involve garbage sorting. Littering in the sewers clogs the pipes that cause flooding as in the streets. People do not consider waste categorization seriously, which poses plenty of problems. Additionally, the agricultural waste

contains numerous hazardous chemicals, damaging water sources; many farmers also find it "convenient" to throw garbage in ponds, waterways, canals, etc.

Indirect factors originate from the education industry: school plays a specific role in shaping the knowledge and attitudes of younger generations regarding the environment and biodiversity. (Rieckmann, 2018). Nevertheless, education seems to neglect to provide individuals with the necessary knowledge, skills, and environmental conservation. Trash sorting and disposal have not been strictly enforced; sometimes, it is merely a few uninteresting lectures that have not been invested in an attempt to attract students and enable them to recognize the necessity of waste management.

Weak national and local government enforcement of the environmental protection

On the national level, the sewage treatment process still includes numerous disparities. Many developing countries, like the Philippines, Vietnam, and Indonesia, have outdated sewage treatment technologies that work poorly, therefore, are not purified, sorted, or recycled effectively. Tourism activities are also to bear responsibility: the more tourists there are, the more rubbish there can be, having a detrimental effect on waste collection and treatment. Many countries, particularly Thailand, the Philippines, and many others, have been pushed to suspend several tourist attractions that have been severely impacted by tourist trash. On the local level, consequences of local authorities' indifference: Many localities have not appropriately fully cooperated with waste treatment legislation, decrees, and laws, have not strictly conformed with punishments for the act of polluting the environment carelessly in the wrong place, and have not attentively managed the waste treatment system.

During Covid 19: factors related to Covid-19 that have impact on the amount of SUP

At first glance, the COVID-19 pandemic appears to be indirectly contributing to the UN 2030 Sustainable Development Goals (SDGs), which are specifically 11, 12, 13, and 15. In order to improve overall city health and safety (Silva A. L.-S., 2021). The ideal action is to lower the level of greenhouse gas emissions (GHG), outdoor air pollution, and environmental noise level including underwater noise due to reduced marine transportation activities, land and wildlife pressure (Silva A. L.-S., 2021). However, the rise in the number of consuming SUP including PPE, and the shift in waste management priorities are counter-productive to environmental sustainability considered as factors of the green and circular economies (Silva A. L.-S., 2021). Covid 19 led not only to the biggest loss of lives, it also caused a global recession and a considerable quantity of medical waste. The most significant shift is due to personal protective equipment consisting of disposable plastic, single-use degrees, and online purchase for essential needs.

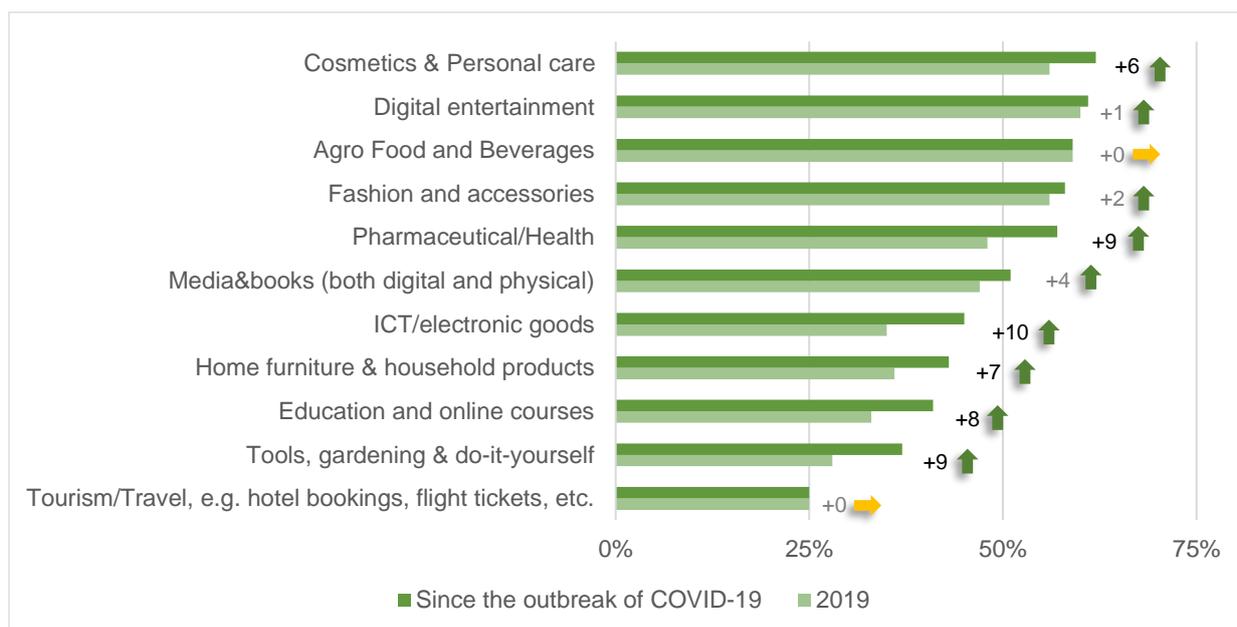
Increased medical waste during the pandemic

Face masks were shown to be 79 percent efficient in avoiding transmission if used by all household members prior to the onset of symptoms (Jeremy Howard, 2021). To avoid virus transmission, it becomes necessary to use PPE, such as surgical masks and gloves, by healthcare professionals and subsequently by the general population. Each month, it is estimated that 129 billion masks and 65 billion gloves are consumed globally (Prata, 2020). The rise in public demand for the use of PPE rapidly became contentious due to incorrect handling and destruction, as well as shortages of the material in hospital settings, where it is essential and most important. At the height of the epidemic level, the Chinese city of Wuhan generated almost 247 tons of medical waste each day, nearly six times more than before the outbreak (Singh, 2020).

Increased use and demand of SUP for packaging

The Covid-19 pandemic has prompted an unprecedented shift in consuming habits, especially as lockdowns contribute to an increase in online shopping and delivery services. According to the UNCTAD and Netcomm Suisse eCommerce Association survey, which was performed in partnership with the Brazilian Network Information Center (NIC.br) and Inveon as in figure 3, online purchases have surged by 6 to 10 percentage points across most product categories.

Figure 3: The shares of online shoppers making at least one online purchase every two months in some countries in 2020 (%)



Source: (UNCTAD and NetComm Suisse eCommerce Association, 2020)

The total or partial shutdown of food facilities for indoor services boosted demand for delivery services by around 15%, adding to the increase usage of SUPs (EAE Business School, 2020).

Safety concerns related to supermarket shopping during COVID-19 have resulted in consumers and suppliers favoring fresh food packaged in plastic containers (to avoid food contamination and extend product shelf life), and using disposable food packaging and plastic bags for groceries. One of the most obvious examples of the increase in the amount of plastic packaging is that most airlines have changed the ways they serve food and drinks. Instead of pouring drinks into a plastic cup, flight attendants handed passengers bottles of water, soda, and wine, and all dishes were prepackaged inside the plastics bag (Martín, 2021).

Increased SUP of sanitary products during the pandemic

In addition to the habit of wearing a mask to avoid the virus, people also pay more attention to the disinfection of hands or items, leading to the need of using cleaning and disinfecting products. These products are used a lot today such as wet wipes, hand sanitizers, alcohol solutions to sterilize implements, cotton buds, etc. Wet wipes are wet cleaning tissues or towels that are intended to be used just once. 90% of wet wipes marketed are manufactured from synthetic materials such as polyester or other harm to the environment (ITV News, 2021). Hand sanitizer bottles are very popular, just like plastic bottles, they are released in large quantities contributing to the pollution. Furthermore, cotton buds are often generally made with both cotton and plastic. Some cotton buds are plastic-stemmed while others are paper-stemmed. This implies that these cleaning products come in a variety of designs. This is to say that they will complicate the process of recycling (Rinkesh, 2021). This type of item is used many times for the purpose of taking samples for testing and it comes in many popular COVID-19 test kits on the market. Thus, this could also be considered medical waste. In most cases, PPE will likely be discarded without precautions along with empty hand sanitizer bottles and organic solids in regular municipal solid waste. These wastes were thrown away indiscriminately in the environment.

Solutions have already been used to tackle the increasing amount of single-use plastic

Plastic production has numerous detrimental repercussions on our environment, such as the emission of greenhouse gasses and toxic waste. The chemicals emitted by the manufacturing process accumulate on land and in seas, rivers, air, and ice, causing terrible harm to human and ecological health. Unfortunately, these issues are still little recognized.

Confronted with an increasingly severe situation of plastic waste pollution, Vietnam's Prime Minister has directed offices and agencies to discontinue the use of single-use plastic products by 2020. The Prime Minister has aimed that, commencing in October, Ministers, Heads of Ministerial-Level Agencies, Governmental Agencies, People's Committees of Provinces, and Cities to issue guidelines or proposals for the intervention of plastic waste. According to the proposal, the entire country has set a goal of eliminating the use of single-use plastic products by 2025. The Canadian government has taken the following collaborative steps to reduce plastic pollution: Under the Canadian Environmental Protection Act, harmful single-use plastics will be prohibited as early as 2021; companies producing plastic products or selling items with plastic packaging will be made accountable for controlling their collection and recycling of plastic waste; collaborating with industry to reduce and recover ghost fishing gear; investing in new Canadian advanced technologies; mobilizing international support to tackle plastic pollution, and reducing plastic waste from federal operations (Mont-Saint-Hilaire, 2019). Japan launched a plastic-reduction plan in June 2019. By installing dedicated recycling bins adjacent to vending machines, the Japanese government aimed to achieve 100 percent efficient use of plastic bottles (WAKAI, 2021). In addition, Japanese authorities have intensified patrols to prevent illegal disposal. As a result, the government will install particular bins for collecting plastic waste nationwide, promote activities to collect trash in rivers and oceans, and develop biodegradable packaging materials (y Mizuki Kato, 2021).

Most EU Member States have undertaken voluntary measures or entered into agreements with merchants to phase out the usage of plastic carrying bags progressively. On the other hand, Cyprus, Italy, Poland, Portugal, Bulgaria, the Czech Republic, Denmark, Ireland, Malta, the Netherlands, Romania, and Slovenia do not have voluntary efforts. Some have incorporated a statute prohibiting it in their national laws (e.g., Ireland), while others do not have an adequate regulatory system. In several EU Member States, voluntary efforts appear to be successfully dealing with the problem of plastic bags. In particular, Austria, Germany, Finland, Belgium, and France have lower single capita consumption rates of single-use plastic carrier bags. Nevertheless, despite implementing voluntary activities, plastic carrier bag use and littering rates stay high in Hungary, Lithuania, Slovakia, and Latvia (Mezei, 2018).

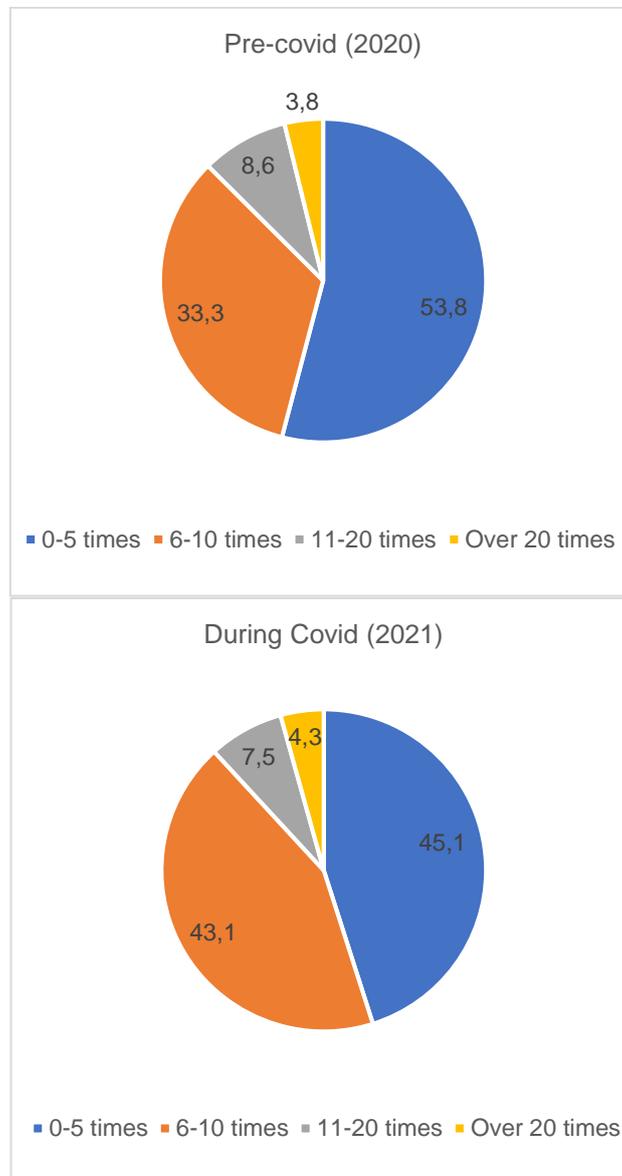
In healthcare, one of the most critical aspects is hygiene, which plastic can help to ensure due to its ability to protect from containments and environments. Plastics have been used in hospitals in a myriad of areas, ranging from disposable plastic syringes and prostheses to surgical instruments. When single-use plastics were first introduced into hospitals, they were an excellent replacement since they allowed for the preservation of a sterile environment and allowed infected plastic material to be conveniently thrown away. The Royal College of Physicians stated 12 principles to reduce waste. The three most important are responsible procurement, mindful use of plastic, and recycling. According to the Royal College of Nursing (RCN), surgical gloves have been overused by the Royal College of Nursing (RCN) over the years. Gloves are critical for controlling infections and reducing the risk of cross-infection between patients and workers. However, excessive use may result in poor hand hygiene (users do not wash their hands properly because they assume the gloves will do the work), increasing the risk of infection. Recycling in a hospital is not easy because it demands proper hygiene. Domestic and infectious waste clearly can not be recycled. However, wards should find ways to divert or prevent waste from going to landfill sites or incineration plants (Davis, 2022).

Therefore, to overcome the issue of environmental pollution in general and waste in particular, we conclude that it is vital to focus on the solution ecosystem, which incorporates multiple cultures, scientific investment, information communication, technology infrastructure, and administrative compliance.

Results and discussion

The frequency of using SUP per week (times/week)

Figure 4: Percentages comparison of the frequency of using SUP weekly by students at the FIMB, BBS between 2020 and 2021 (%)



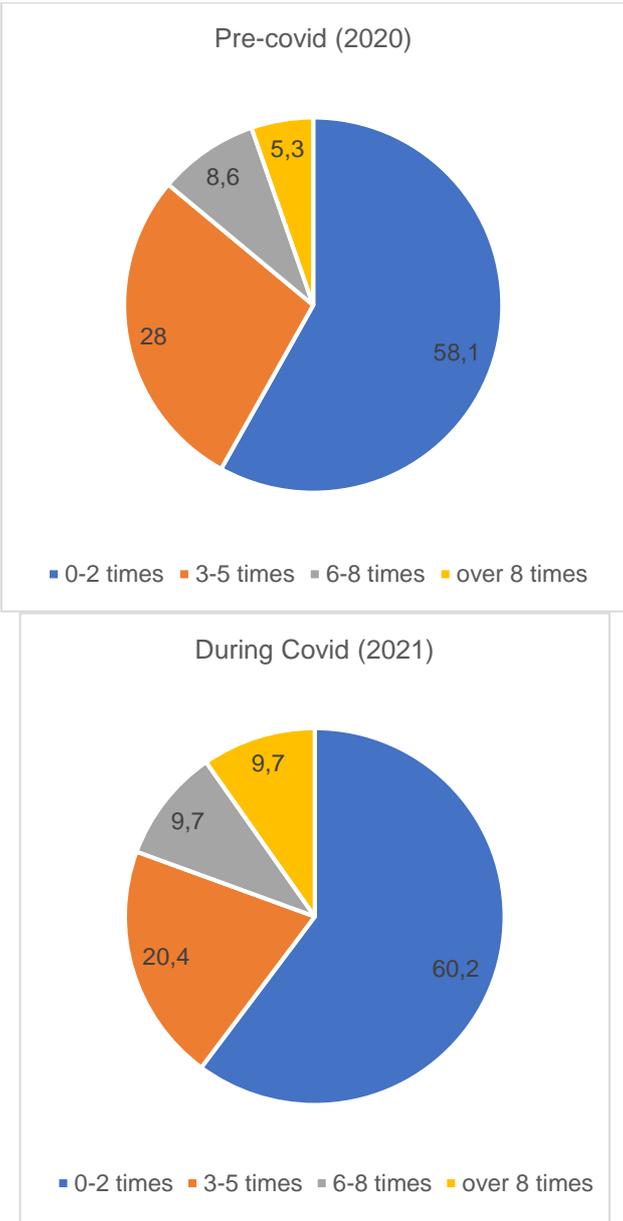
Source: Own creation

Figure 4 with two pie charts illustrates the number of times that students in the FIMB, BBS, use SUPs and how this has changed over one year period from 2020 (before the Covid pandemic, the first three months of 2020) to 2021 (during the Covid pandemic). At the first glance, in both years, the most significant number of times students use plastic is 0 to 5 times a week, accounting for half of the respondents. In comparison, students who use plastic over 20 times a week account for the least percent, only 4.3%, even during Covid 19. It can be clearly seen that the proportion of students using plastic 6 to 10 times a week has increased by approximately 10%, from one-third of the students to nearly half (43.1%). This increase is mainly because of the increase in the use of packets and wrappers (food containers, beverage containers,..); mainly medical (masks, gloves, face shields) and sanitary items (wet wipes, cotton bud sticks). However, there is no substantial growth recorded in this number because the pandemic also helps decrease the amount of SUP among students by minimizing the use of plastic bottles or plastic cups used in universities. Because of the pandemic, students were allowed

to study online classes instead of going to school in the traditional ways. Accordingly, the consumption of single plastic were not increasing significantly in the university. Moreover, at the peak of the Covid pandemic, people tended to cook at home rather than ordering food since they were afraid of the risk when exposed to the shippers. Meanwhile, global plastics use in 2021 was estimated to have declined 2021 by around 10 million tonnes (Mt) or 2.2%, which is 4.5% below the pre-COVID projection for 2021 (OECD, 2022).

The frequency of ordering food/shopping online weekly (times/week)

Figure 5: Percentages comparison of the frequency of ordering food/ online shopping by students at the FIMB, BBS between 2020 and 2021 (%)



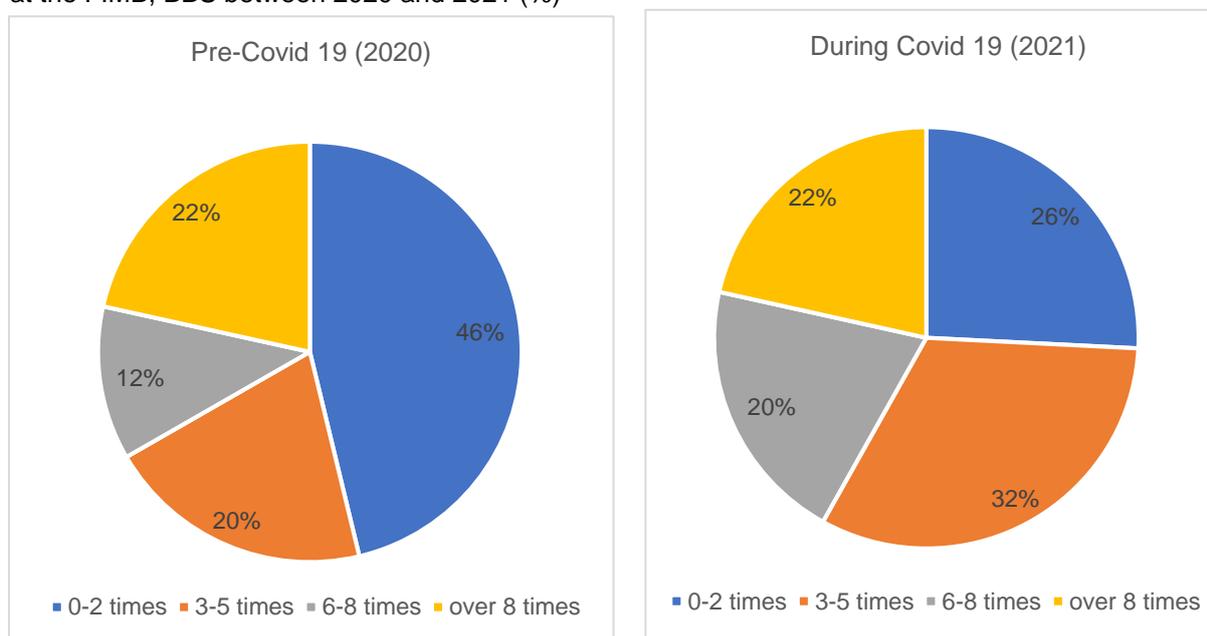
Source: Own creation

As can be observed from Figure 5 showing the frequency of ordering food/ online shopping weekly before and during Covid 19, there is no noticeable difference in the students' ordering habits and online shopping habits, only a mild fall in the percent of respondents doing this 3-5 times a week by 7.6% (from 28% to 20.4%). Despite the increasing demand for food delivery and online shopping due to social

distancing, the effects of the coronavirus pandemic hit household spending harder than following the Global Financial Crisis. During the first two quarters of the pandemic, household spending fell 22.2% because of the introduction of lockdowns and other public health restrictions. These particularly affected social expenditures, such as dining out, recreation, and culture (Taiyan Lee, 2022). This decrease in household spending can be explained by the evidence reported in various studies indicating that pandemic disease impacts a country's economy through several channels, including the health, transportation, agricultural, and tourism sectors (Feyisa, 2020). On the one hand, about the global habits of ordering food and online shopping, an overall increase may be attributed to the closing of restaurants and hotels, resulting in a shift to take away and home deliveries. On the other hand, reduced shopping, commuting, travel, and the cancellation of events and festivals may have resulted in fewer take-away meals from these activities (Kathrin Graulich, 2021).

The frequency of using masks, gloves, face shields weekly (times/week)

Figure 6: Percentage's comparison of the frequency of using masks, gloves, face shields by students at the FIMB, BBS between 2020 and 2021 (%)

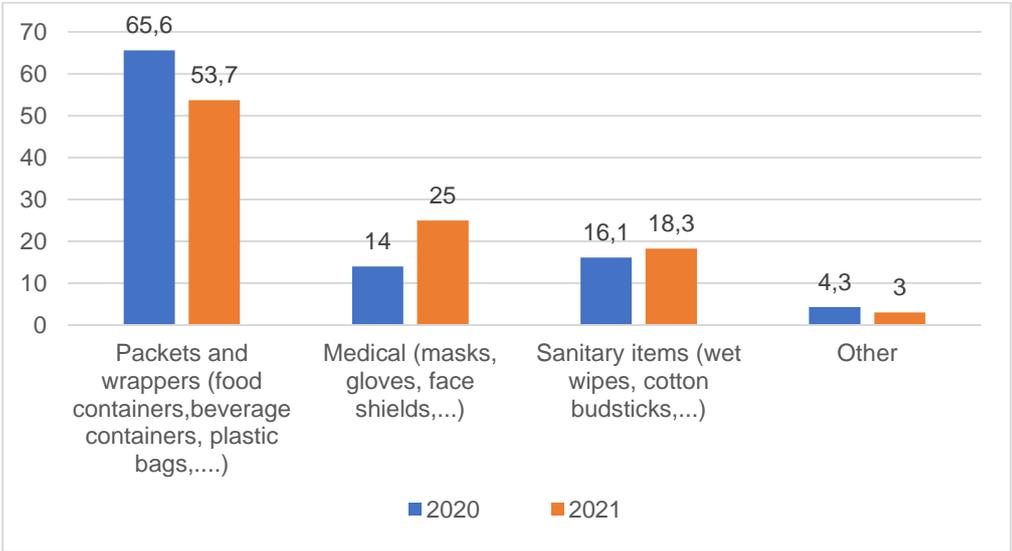


Source: Own creation

Figure 6 shows a big change, if in 2020 the number of times using masks, gloves, face shields,... less than 2 times/week accounts for the majority with 46 percent, one years later, the consumption of these items increased greatly, from 20 percent to 32 percent of people using it 3-5 times a week, occupying the largest position of the chart. Moreover, the number of people using 6-8 times a week has also increased by 8% since 2020 which is 12%, and the number of users more than 8 times has remained at 22 percent. Thus, it can be seen that a large number of masks, gloves, and face shields have been discharged since the outbreak of the disease. Understandably, many people used masks to protect themselves, causing this type of garbage to increase. This number has increased many times because the maximum duration of a mask is 4 hours to avoid infection, its uses seem to come from the World Health Organization (WHO) recommendation given in March 2020 (World Health Organization, 2020), therefore, the number of medical masks and gloves discharged every day is extremely large. Improper disposal of disposable gloves and masks, along with other plastic items, has been found littering some public places. For instance, a considerable amount (compared with only one or two items observed per month) of disposable masks was observed in a 100 m stretch in Soko's islands beach, Hong Kong, during an environmental survey carried out by the NGO Oceans Asia (Oceans Asia, 2020).

The main reasons for using SUP

Figure 7: Percentage's comparison of the main reasons for using SUP by students at the FIMB, BBS between 2020 and 2021 (%)

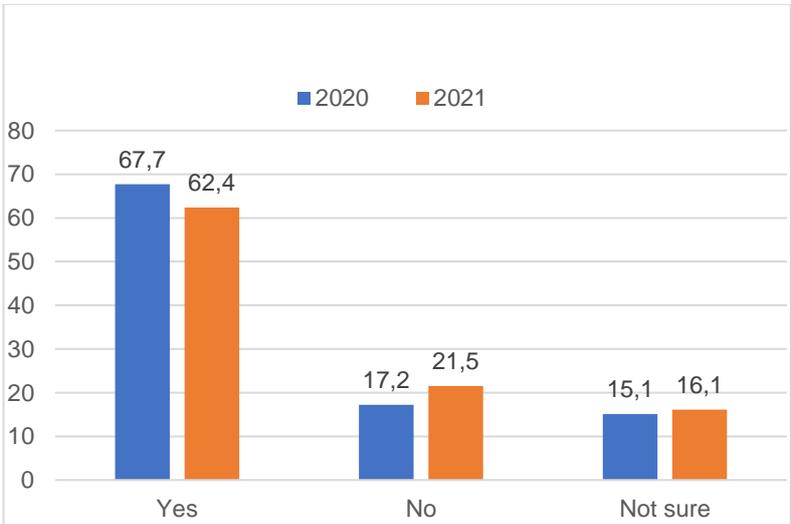


Source: Own creation

It can be seen obviously the figure 7 that the Package and Wrappers column was the highest of both times and the number for 2021 was 11.8 percent lower. In contrast, because of the pandemic, the number of masks, gloves, and face shields,... was two times as big as these one years ago. Similarly, the number of sanitary items was 2.2 percent smaller than that in 2021, with 25 percent. In the United Kingdom, 11 billion wet wipes are discarded each year, and their use has soared since the beginning of the Covid-19 outbreak (ITV News, 2021). As in the study of BusinessWaste.co.uk, up to 10 million empty bottles wind up in already overcrowded disposal sites (Hall, 2020). It can be seen that the impact of the epidemic has created a significant change in the use of plastic products.

Plastic recycling habits of students at FIMB and BBS

Figure 8: Percentage comparison of plastic recycling habits of students at FIMB, BBS between 2020 and 2021 (%)

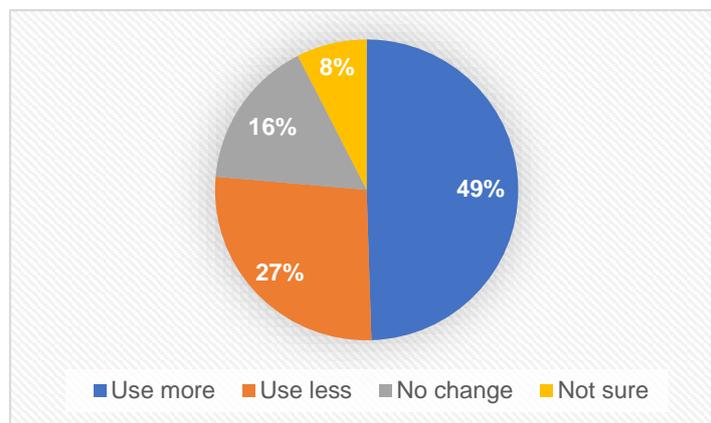


Source: Own creation

Based on the comparison results of students' plastic recycling habits as shown in Figure 8, knowledge about recycling and how to separate garbage is still ambiguous leading to 15-16 percent of interviewees still saying that they were not sure if they recycle plastic waste or not. Besides that, perhaps good sustainability education has helped a large number of students to become recycling conscious, over 67 percent, this number has decreased significantly now compared to the past. This result is much higher than the specific goal for plastic packaging recycling of a preliminary political agreement between the European Council, European Parliament, and European Commission that 50 percent by 2025 and 55 percent by 2030 (Silva A. L.-S., 2020). The percentages of people who did not recycle before and during Covid differed slightly, at 17.2 percent and 21.5 percent, respectively, according to Figure 8.

The impact of Covid-19 on the amount of SUP

Figure 9: Percentage of personal feelings about the impact of Covid-19 on the amount of SUP by students at FIMB, BBS in 2021 (%)



Source: Own creation

Figure 9 demonstrates that half of the respondents said they used more SUP due to the impact of the pandemic, this was 3 times higher than the number of people who thought this did not affect their plastic consumption, which is 16 percent. The negative impact of the epidemic on the amount of plastic discharged every day can be seen. Governments have accepted the trade-off of rising waste in general and SUP in particular to reduce the risk of virus transmission. In addition to masks, gloves or other types of plastic directly related to health, the closure of restaurants and shopping stores made people choose to shop online and as a result, plastic bags and plastic boxes are used to protect food storage, styrofoam boxes, plastic straws, plastic cutleries, ... increased many times compared to before. However, with 27% people use less plastic because they spend less time outside during the epidemic, the majority of the time they use staying at home. As a consequence, the use of face masks and face shields has not risen considerably. In addition, they have more spare time to cook and improve their health; therefore, the amount of packaging is decreasing slightly.

Conclusion

This study was implemented to measure the amount of SUP impacted in the pandemic consumed by FIMB students at BBS. The findings demonstrate that, as predicted, the COVID-19 pandemic and its subsequent lockdowns changed consumer behavior, not just in terms of purchasing patterns but also in terms of trash production. Here the SUP as disposable gloves and masks were intended to analyze. According to the data we investigated, 49% of students inquired assumed that their consumption increasing than before COVID 19, emphasizing the expansion in food packaging and single-use plastic bags. Nonetheless, a sizable number of people are making attempts to segregate plastic garbage and minimize their usage of SUP.

Some solutions should be carried out as ways of reducing this plastic utilization in terms of individuals and organizations. Students could choose biodegradable package food or even purchase the less packed food. It makes the food industry, and the retailers motivated to get business opportunities because of adjusting consumer behavior by introducing alternative packaging. In addition, students can

participate in communication professionals, and non-governmental environmental organizations, to promote the message of minimizing the usage of unneeded SUP during the epidemic and encouraging alternative methods of consuming certain items (ex. reusable masks, bio-plastic bags). The young generation who are students is ideal ambassadors representing future owners of the earth to join hands so as to reduce plastic waste. Moreover, Budapest Business School can maintain plastics as its priority mission by organizing many conferences, and workshops with an aim to raise awareness of students in protecting the environment and to give them sustainability education.

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Digital, social, and human development sustainability, and well-being

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Abstract

The paper focuses on how the digital revolution affects the EU27 countries. We have examined the Digital Economy and Society Index and its relationship with economic and sustainable development indicators to capture the impact of digital development in the past six years. Some researchers are sceptical, about whether digitalization has positive, or negative effects on the economy and sustainability. We wanted to contribute to this debate by examining related indicators. Our findings show that digitalization has a strong correlation with the main economic indicators, however, does not contribute to a sustainable economic and social environment in a 6 years' timeframe.

Keywords: economic development, Digital and Society Development Index, DESI, sustainability, well-being

Introduction

Digitalization cannot solve sustainable development goals on its own. Our findings show that a longer time is needed than just a governmental cycle to reach a higher level of sustainable economic development level. On the other hand, the more a country's economic development, the more its digital development. The value of our research could be useful for policymakers. A one-time investment in digitalization could not solve both social and economic problems. Policymakers and government officials should concern about focusing on a long-term economic and digitalization development plan, which could contribute not just to economic development, but also to the well-being of the inhabitants.

Literature review

Digitalization, quality of life and well-being

Digitalization itself does not directly affect quality of life and purchasing power, but digital technologies stimulate innovation (Falk & Biagi 2015); moreover, the integration of digital technologies into the operation of companies improves productivity. Entrepreneurial managers (Hortoványi 2012) are making a number of new digital products and services available to a wide range of consumers that improve their quality of life and purchasing power. Quality of life and purchasing power can also be improved by creating new jobs, but it is important that if this is the case ('growth model'), it only can be sustainable if it is employment-intensive (Georgescu & Herman 2019). On one hand, digitalization brings about a higher standard of living, but on the other hand, a higher standard of living enables to achieve a higher digitalization level by meeting rich customer's higher expectations (Hecht 2018). This could lead to a vicious spiral, where the rich become even richer.

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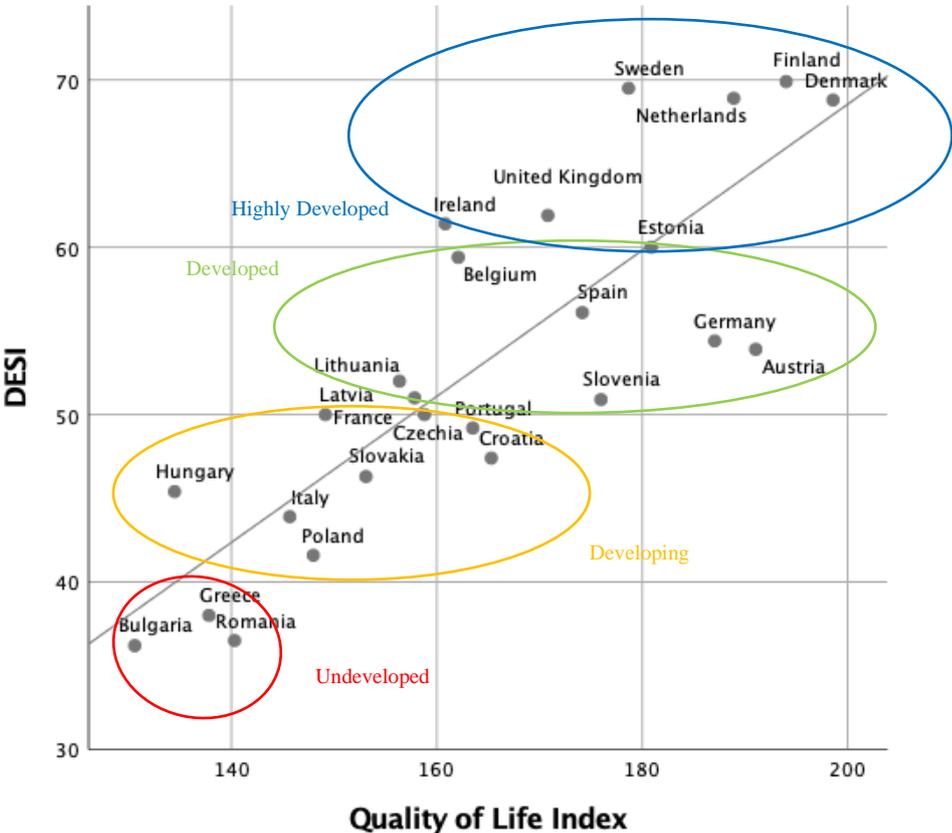
In their study, Nevado-Peña et al. (2019) discovered a clear link between the assessment of the quality of life of the inhabitants of a given country and the technological characteristics of the affected (geographical) area. Niebel (2018) also suggests that economic development strongly correlated with digitalisation (ICT usage). Accordingly, the life satisfaction rate increases in parallel with the achievement of different technologies and higher levels of ICT readiness. Citizens living in cities with higher ICT capacity or a high uptake of digital solutions are more in need of sustainable and inclusive economic growth. Finally, the use of ICT by technology users leads to a better assessment of the efficiency and governance of public administration, emphasizing the importance of understanding between users and public services in the virtual sphere. However, Pozdnyakova et al. (2019) see a further restructuring in employment. From their perspective Industry 4.0 ends up in further (specialist) job losses due to the machine-induced reduction in human participation in production.

Research results and methods

Connection between digitalization and the main economic indicators

In the following, I will present the connection between the level of digitalization and social welfare, using data of the EU member countries. The results are represented in a scatterplot diagram with regression lines. I used this kind of method in order to capture how “digitalization affect each country’s economy in different ways. In other terms, I am observing whether digitalization (DESI) can be an explanatory variable, if digitalization can truly enhance the changes in each economy. For demonstrating the results simply, I only observed data from 2019. In my future research path I am planning to do a more widespread (involving more variables, involving time series) research concerning the ‘digitalization-effect’.

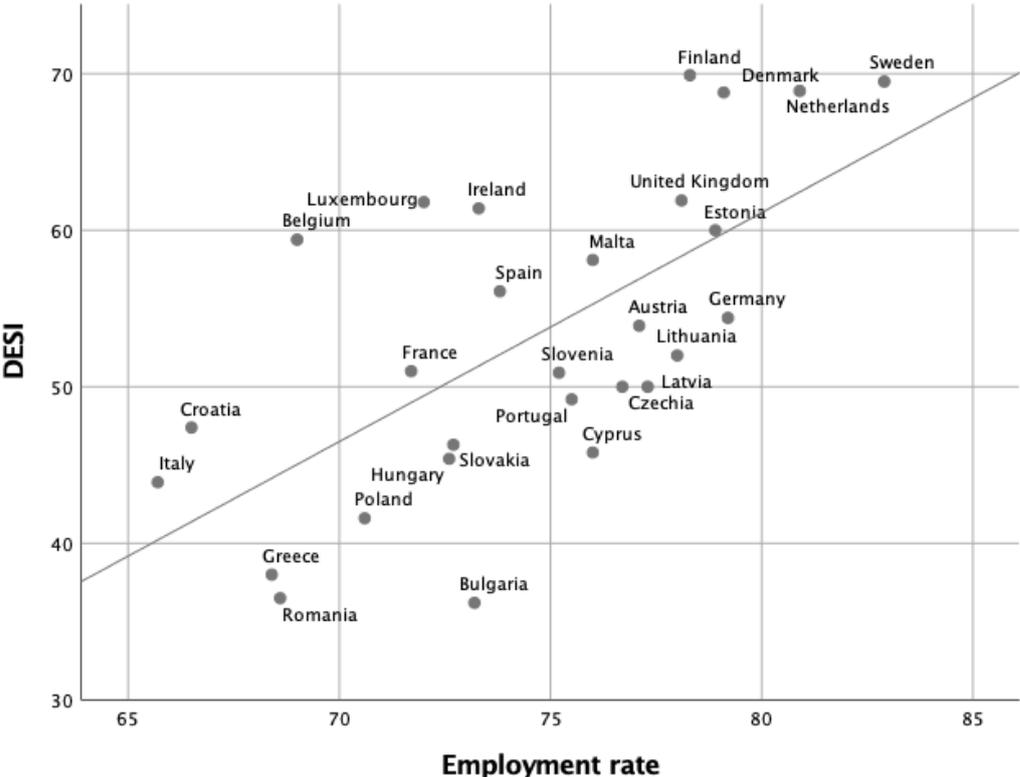
Figure 1. Scatterplot of DESI and Quality of Life



Source. Own calculations based on data from Eurostat and Numbeo (2019).

The scatterplot analysis of digital development (2019) and quality of life (2019) clearly shows that the observed countries show (the regression fit line) a strong relationship ($R^2 = 0.7$) (Figure 1.). In order of consistency, I have created four categories for the examined countries based on their digital development (DESI) values. These are groups of “undeveloped” (from 30 to 40), “developing” (from 41 to 50), “developed” (from 51 to 60) and “highly-developed” (from 61 to 70+) countries.

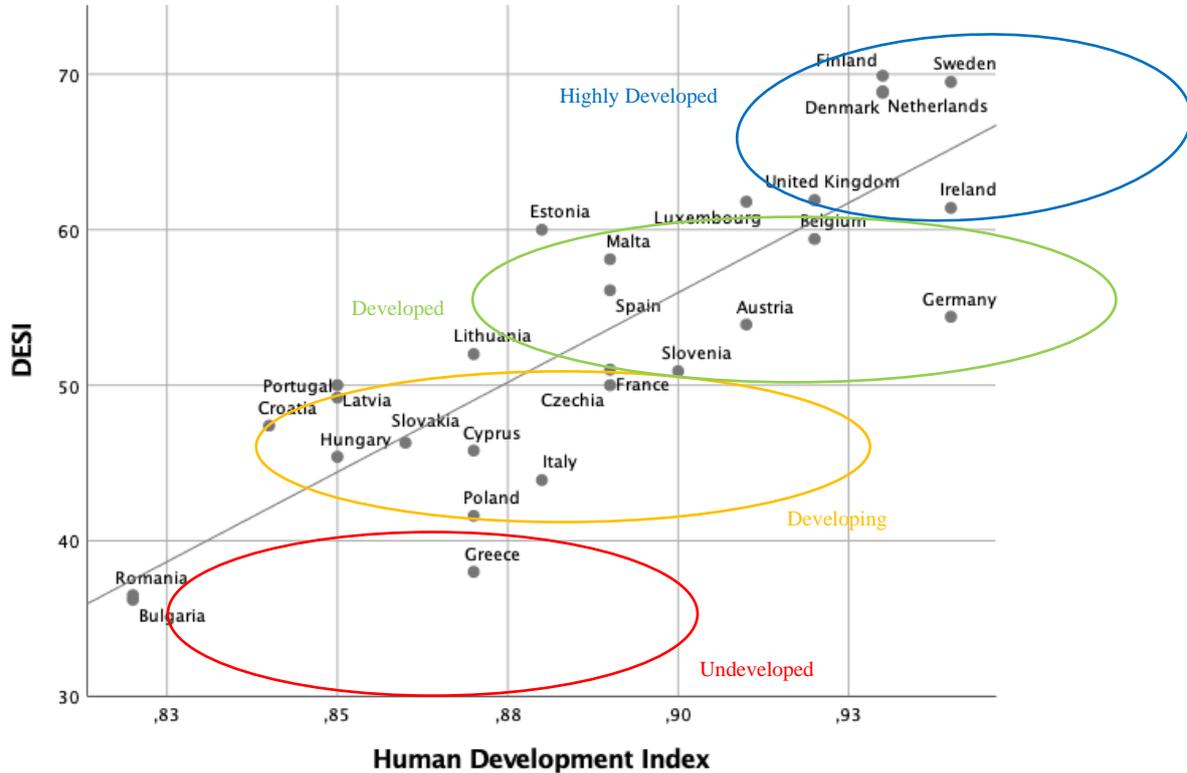
Figure 2. Scatterplot of DESI and Employment rate



Source. Own calculations based on data from Eurostat (2019)

The employment rate (2019) and digital development (2019) also show strong correlation ($R^2 = 0.424$) (Figure 2.). In terms of digital development and employment rate, less-developed countries can be distinguished. This is true for both the group of high and low development countries. Regarding digital development (thus indirectly productivity) and employment issues, Király and Köves (2015) states in their book review that technological development reduces employment only temporarily, but later, as a result of these processes, the employment rate not only returns to its original level but exceeds. Furthermore, they see a strong link between advances in digitisation processes (robotics and possession of different technologies) and growing disparities in economic development. Losonci et al (2019) also strongly related to this train of thought. They highlight the importance of the integration of individual companies into international knowledge-transfer, the digital development it brings, and the resulting improvement in labour productivity. Concerning the two observed variables, the Nordic countries (Netherlands, Denmark, Sweden, Denmark, Finland, Ireland) has also performed well. Countries with a significant share of gross domestic production from tourism showed lower values in both digital and employment terms. This is partly due to the fact that these countries have less strict rules on the provision of statistics and as mentioned earlier, the problem of employment statistics. Bulgaria is also one of the countries with low digital development, but it can still show a high(er) employment rate.

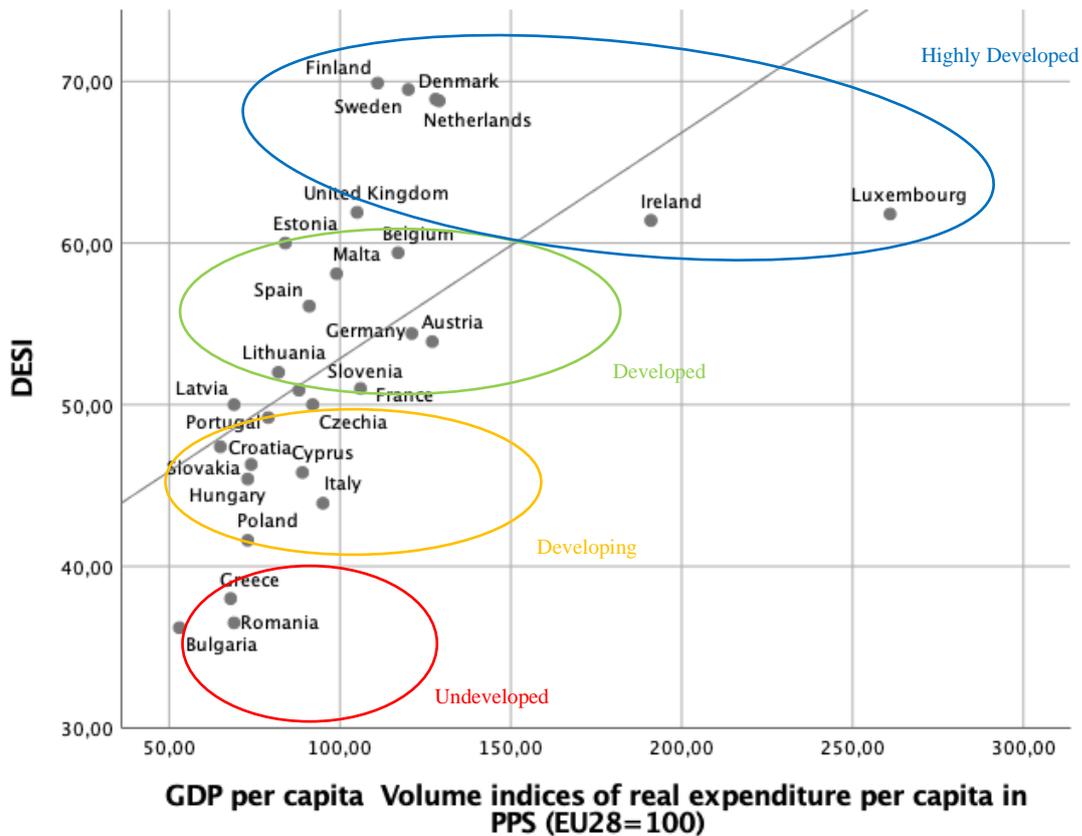
Figure 3. Scatterplot of DESI and Human Development



Source. Own calculations based on data from Eurostat (2019) and The United Nations (2019).

Human development and digital development also show a strong correlation ($R^2 = 0.701$) (Figure 3.). Although digitalization leads to higher productivity, it can eliminate existing jobs according to Csoma (2018) but also transform them. Digitalisation can create higher added value, new jobs and help create new positions, which can also support economic recovery. At the same time, there is a danger that the competitiveness of less developed countries may deteriorate further, and the development gap may widen further. This is partly due to the fact that less developed countries (in many cases) can only gain additional working capital inflows through lower wages, and consequently one of the keys to economic development. Undeveloped countries include Romania, Bulgaria and Greece, which performed poorly on both variables examined. The 'developing' group consists of, Slovenia Croatia, Hungary, Slovakia, Latvia, Portugal, Poland, Italy, Cyprus, Slovakia, and the Czech Republic. Developed countries include Austria, Malta, France, Spain, Lithuania, Slovenia, Belgium, Germany and Estonia. The highly developed group consists mainly of Nordic countries (Finland, Denmark, Sweden, the Netherlands) and the United Kingdom and Ireland.

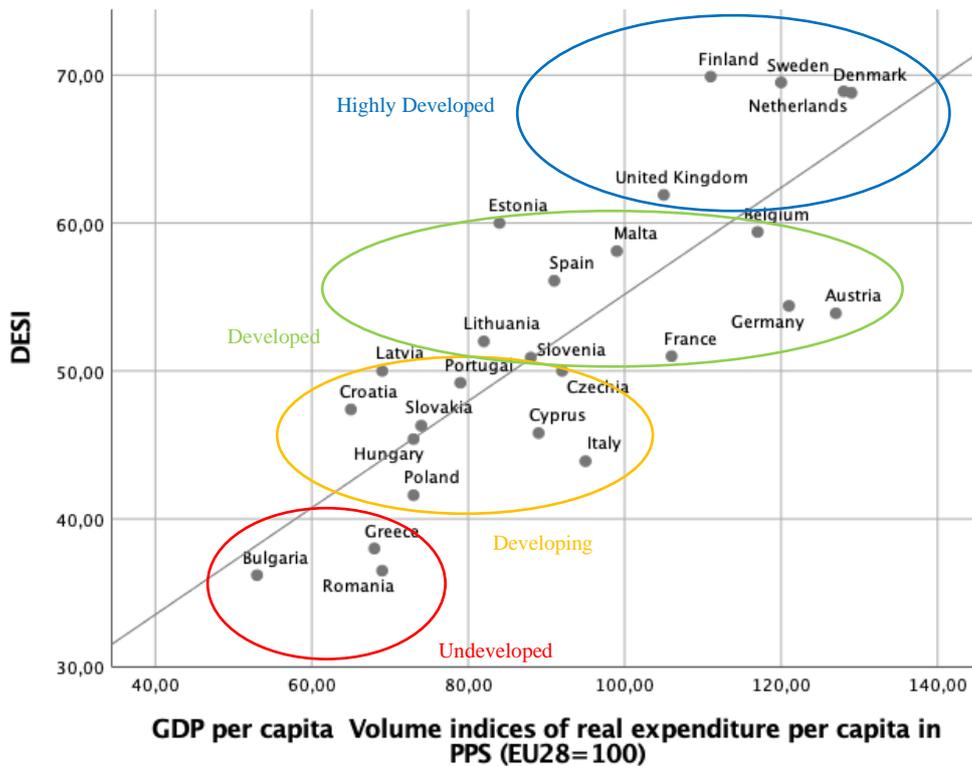
Figure 4. Scatterplot of DESI and GDP per capita (PPP)



Source. Own calculations based on data from Eurostat (2019).

There is a moderately strong correlation between digital development and GDP per capita (0.354) (Figure 4.). In this case, different groups can also be distinguished when examining the variables. The Nordic countries (Finland, Denmark, Sweden and the Netherlands) clearly create a separate group with inclusion of the UK, Ireland and Luxemburg. Developed countries include Estonia, Malta, Belgium Lithuania, Spain, Austria, Germany, Slovenia, and France where digital development is lower than in the previous group, but in terms of GDP per capita are more developed. Other EU countries are mostly on (or close to) the trend line, with lower values for both indicators. The standard deviation of the two variables examined shows that Luxemburg and Ireland are outliers (due to their extremely high level of GDP per capita), distorting the results (correlation). Therefore, I have also performed an analysis omitting these countries.

Figure 5. Scatterplot of DESI and GDP per capita (PPP)¹⁴



Source. Own calculations based on data from Eurostat (2019).

Excluding Luxembourg and Ireland as an (outlier) country (Figure 5.), the scatterplot has changed significantly. Most of the EU28 countries fits the trend line. With the exclusion of Luxembourg and Ireland, the correlation index also rose from 0.354 to 0.64 (Figure 5.).

Digitalization and SDG goal results

We have also observed the 17 SDG goals of EU compared to DESI (Digital and Society Development Index). We wanted to find out, what connection is between digital development and the different sustainability figures. We have examined the development of DESI and the different SDG goal scores.

We can conclude that there is a strong correlation between digital development (DESI), social welfare, and sustainability.

¹⁴ Without Luxemburg and Ireland.

Table 1. The relationship between Digital Economy and Society Index (DESI) and SDG components

	DESI_21_16	
DESI_21_16	Pearson Correlation	1
	Sig. (2-tailed)	
	N	27
no poverty	Pearson Correlation	.635 **
	Sig. (2-tailed)	<.001
	N	27
zero hunger	Pearson Correlation	.407 *
	Sig. (2-tailed)	.035
	N	27
good health and well-being status	Pearson Correlation	.778 **
	Sig. (2-tailed)	<.001
	N	27
quality education status	Pearson Correlation	.732 **
	Sig. (2-tailed)	<.001
	N	27
gender equality	Pearson Correlation	.442 *
	Sig. (2-tailed)	.021
	N	27
clear water and sanitation	Pearson Correlation	.509 *
	Sig. (2-tailed)	.044
	N	16
affordable and clean energy	Pearson Correlation	.107
	Sig. (2-tailed)	.596
	N	27
decent work and economic growth status	Pearson Correlation	.627 **
	Sig. (2-tailed)	<.001
	N	27

industry, innovation and innovation status	Pearson Correlation	.750**
	Sig. (2-tailed)	<.001
	N	27
reduced inequalities	Pearson Correlation	.299
	Sig. (2-tailed)	.146
	N	25
sustainable cities and communities	Pearson Correlation	.613**
	Sig. (2-tailed)	<.001
	N	27
responsible consumption and production	Pearson Correlation	.681**
	Sig. (2-tailed)	<.001
	N	27
climate action	Pearson Correlation	.335
	Sig. (2-tailed)	.095
	N	26
life below water	Pearson Correlation	. ^c
	Sig. (2-tailed)	.
	N	0
life on land	Pearson Correlation	.038
	Sig. (2-tailed)	.878
	N	19
peace justice and strong institutions	Pearson Correlation	.683**
	Sig. (2-tailed)	<.001
	N	27
partnership for the goals	Pearson Correlation	.068
	Sig. (2-tailed)	.735
	N	27

Source: Eurostat

Conclusions

We can see from the scatter-plot figure, that there is a strong linear correlation between social welfare and digitalization, however there is also a strong connection between quality of life and digital development. From this perspective, we have started to investigate further these connections, therefore, we moved further through the EU sustainability (SDG) goals.

Most of the 17 SDG goals have a strong correlation with DESI. We can conclude the following from the correlation table:

1. The more digitalized each country is, the least poverty can be seen there.

2. The more digitalized each country is, the better its inhabitants' health and well-being.
3. The higher digitalization development is achieved, the higher is each country's workers decency, and the higher is their economic growth status.
4. The higher digitalization development is achieved by a country, it is more innovative and can provide a more sustainable economy.
5. The more digitalized each country is, the more responsible of its inhabitant's consumption is.
6. The more digitalized each country is, the more its legal development is.

Also, it is important to mention that digital development has its barriers, it does not solve everything at once. From the time series data, we can state two things:

1. Digitalization and sustainability do go together hand-in-hand, but it takes a long time to show its effects on each economy.
2. Therefore, we would recommend policymakers to consider and develop a long-term digital development policy, because it takes a long time, to see the investment and afterwards the first steps.

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Sustainable influencer marketing

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Abstract

Most of the time if we think about influencer marketing the first thing, we think of is consuming. How can something that supports purchasing be sustainable? In order to research the topic of sustainability in connection with influencer marketing, I conducted a questionnaire at the Faculty of Economics and some of its results were interesting. Women are more prone to the effect of influencer marketing, and that gender is also important when it comes to the products, they buy from them. The basis of this research was Nagy, Sz. (2012) publication with the title: "Drivers of environmentally conscious behaviour".

Keywords: sustainable influencer marketing, generational marketing, online marketing, Generation Z

Theoretical overview

As Nagy, Sz. (2012) said in his publication based on the motivations to be more environmentally conscious can be based on many values. He says that being green is mostly driven by emotions. In his publication, he explains the core LOV values of Hungarian people and concludes that the Hungarian people who tend to avoid uncertainty the most are also the most environmentally conscious.

The temporal delimitation of the Z generation is not an easy process, and several studies deal with it, in my present research the definition of my choice is Törőcsik (2014) to refer to.

As a theoretical model for my research, I selected four scales that deal with consumer behavior, the psychological causes of social media use, influencers, and online advertising.

Due to the multidisciplinary nature of my dissertation, I considered it necessary to present a scale on a psychological topic, which is interesting, but together with the scale related to influence, it provides a stable theoretical basis for my research.

Examining attitudes toward online shopping was interesting to me in terms of consumer behaviour, so I took that into account.

In the world of marketing 4.0, the attitude towards ads is also an important part, so I planned to present this last.

In her research, Gangadharbatla, H. (2008) writes about what elements she has for social media to join. In your opinion, these are:

- Attitudes toward social media sites
- Intention to join
- Internet self-efficiency
- The need for cognition
- The need to belong somewhere
- Self-assessment
- Collective self-assessment

In his research, he chose the attitude towards social media sites and the intention to join as the two dependent variables.

The research shows that the intention to join is significantly influenced by the need to belong somewhere, which may be interesting in this regard, as it does not affect this decision.

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Attitudes towards social media sites are positively influenced by internet self-efficacy, the need to belong somewhere, and, surprisingly, collective self-esteem. More information on the psychological reasons for this can be found in the literature review. For the research, the author used a Likert scale.

The scale developed by Bearden, Netemeyer, and Teel (1989) is the second theoretical model I would like to apply to influencing peers in our decisions. It connects the psychological perception and the basis of influencer marketing and consumer behaviour. The scale determines the extent to which a person can be influenced by their peers.

Bearden, Netemeyer, and Teel (1989) refer to the scale as "consumers' willingness to interpersonal influence." and can be defined as "A willingness to conform to others in making a purchase decision."

The scale consists of 12 elements, which are as follows:

- I rarely buy clothes for which my friends have not yet given their blessings.
- It is important for me to buy products and brands that are accepted by others.
- When I shop, I pay attention to buying a product that others have they accept.
- I'm trying to buy a product that others find right for me.
- I like to impress those around me with my purchases.
- If I buy a particular brand, I feel like I belong somewhere.
- If I want to look like someone, I often buy from the brands he uses.
- I also identify myself based on the products I buy from others.
- In order to buy the right products, I often notice what others are buying.
- If I don't know that product group, I often ask for help
- from my friends.
- I often ask my peers for help when looking for alternatives in a particular product line.
- I often ask my family and friends before buying.

I would like to highlight some of the 12 elements, as I consider it important to link them to my research. A review of the literature revealed to me that young people in Generation Z view influencers much more than their friends as "stars". Consequently, I find this scale interesting, as we can find individuals who can be easily influenced by influencers.

There's also a point on the scale that reads, "If I buy a particular brand, I feel like I belong somewhere." With this, I would like to refer to the scale method mentioned earlier, which examined exactly how important it is to belong somewhere.

need to know whether someone is joining a particular social networking site or not. The presence of social media "celebrities" has come to the fore in the concept of influencer marketing. If someone joins a social media site, influencing by influencers can also begin. The main motivation I want to look at later is how much belonging to a person influences that person in their customer decision.

The method chosen to model my research is SEM or Structural Equation Modeling. The special feature of my SEM model is that I combine the latent variables of digital marketing with the latent variables of generation marketing, thus examining this regression model.

One of the articles I used was by Barkhi, Belanger, and Hicks (2008) in which I found some variables that were related to Generation Z e-commerce variables. I would like to use the following variables from this article.

Furthermore, I would like to incorporate elements of the scales presented above into the model.

Psychological variables:

- Peer pressure
- Influencing influencers
- Behaviour control
- The need to belong somewhere
- Variables related to online marketing:
- Simplicity

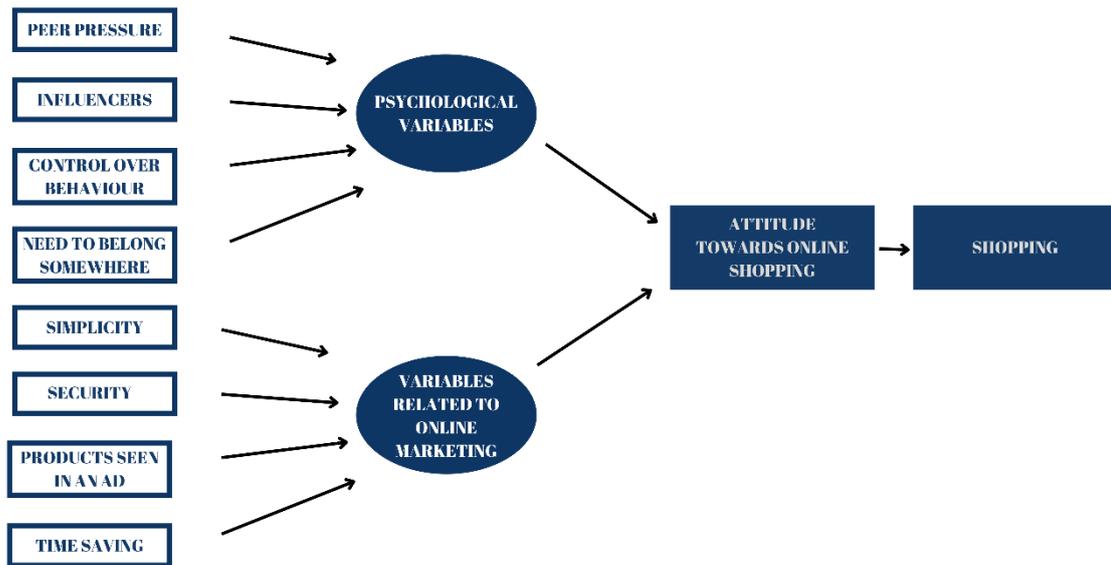
- Safety
- Products have seen in the ad
- Times saving

Previous research

Based on the model presented in the theoretical review, the SEM model was set up, which is the basis of the current research.

The SEM model can be seen below.

Table 1: SEM model of my research



Based on the SEM model, I conducted a focus group interview in which I examined the basis of all variables. In the present case, it is necessary to focus primarily on psychological factors.

One element of the model is the influence of influencers. In my previous research, I asked 10 young people between the ages of 18 and 26 about the factors seen above. It turned out that the younger age group listens much more to influencers, and my female participants prefer to shop based on the suggestions of influencers.

Primary research

Hypotheses

To analyse my research, I put forward the following hypotheses:

H1: Women are more prone to influencer marketing than men.

H2: Younger people are more prone to influencer marketing than older.

H3: Sustainability is more important for the older part of Gen Z.

Research methodology

During the primary research, I conducted a questionnaire survey among the students of the Faculty of Economics of the University of Miskolc. A total of 125 responses to the questionnaire were received, of which 123 were left after purification. 100% of the students were between 18-26 years old. The two age groups I examined were between 18-22 and 23-26 years old. The questionnaire contained a total of 12 questions. I used SPSS software to analyse the answers to the questionnaire, including the Crosstabs / Chi-square test and the Mann-Whitney test.

3.3. Results

As I analyzed the connection with a hypothesis, I found out some interesting things about the Gen Z-ers of the Faculty of Economics.

The first major finding was that there is a significant association between gender and influences by influencers. This was also the result of my previous research in connection with influencer marketing. The results can be seen below, on the Table 2.

Table 2. Analysis of the connection between gender and influence

NEM * INFL Crosstabulation				
Count		INFL		Total
		Nem	Igen	
NEM	Nő	4	89	93
	Férfi	7	22	29
Total		11	111	122

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	10,604 ^a	1	,001		
Continuity Correction ^b	8,324	1	,004		
Likelihood Ratio	8,861	1	,003		
Fisher's Exact Test				,004	,004
Linear-by-Linear Association	10,517	1	,001		
N of Valid Cases	122				

The second thing that was quite interesting for me is that there is no association between age and the ability to be influenced by influencers. For this, I must say that unlike my previous research the older age group was underrepresented in this questionnaire.

Table 3. Analysis of the connection between age and influence

KOR * INFL Crosstabulation

Count

		INFL		Total
		Nem	Igen	
KOR	23-26	1	14	15
	18-22	9	97	106
	Na	1	0	1
Total		11	111	122

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	10,228 ^a	2	,006
Likelihood Ratio	4,959	2	,084
Linear-by-Linear Association	8,958	1	,003
N of Valid Cases	122		

a. 3 cells (50,0%) have expected count less than 5. The minimum expected count is ,09.

The third most interesting however quite logical founding is that there is a significant relationship between gender and what type of influencers they are following. The types of influencers were lifestyle, beauty, travel, videogames, technology, green, and film influencers.

I also did an analysis of their frequencies which showed me that the top 3 topics were lifestyle, beauty, and green influencers in the order shown above. After that the fourth most interesting topic was travel.

I also asked them about the type of product they have bought because of an influencer's suggestion. I made a word cloud out of their answers. The bigger the word is, the more important or most frequently used that word is. This can be seen on Table 4.

Table 4. Types of products they have bought



Another important question was: “What kind of green influencers they are following?” I also made a word cloud out of the answers.

Table 5. Most followed green influencers by the answers



As you can see in Table 5. most of the influencers seen in this picture are in connection with veganism in one way or another. Also, Tebe is a shop but also the name of an influencer's brand. They sell products without any packaging.

For the last hypothesis, I analysed the possibility that gender and age have a relationship with the importance of promoting sustainability. I found out, that there is no difference in attitudes toward promoting sustainability in terms of age or gender.

Conclusion

In conclusion, I can say that out of the three hypotheses I made two should be rejected and one accepted.

The results show that my first hypothesis can be accepted as gender is indeed a big influence in terms of the capability of being influenced by an influencer. This is the one hypothesis that both this and my older research showed me.

My second hypothesis was: that younger people are more prone to influencer marketing than older. Unfortunately, this hypothesis should be rejected as my research showed me that age is not a deciding factor in terms of influencers' influence.

The third one should be also rejected as neither age nor gender makes difference in connection with the attitude toward promoting sustainability.

Future research possibilities

As for the future of this sustainable questionnaire, I think I need to do this with not only the older part of Gen Z (18-26) but also, I would like to ask the younger generations as well. Even though they are under so I will need parental permission to do this research with them.

The second possibility is to do this research with the same age group as this time, but the sample should be even higher, like the entirety of the University of Miskolc.

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Life cycle assessment of composting and utilisation of broiler chicken manure

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Abstract

The management and recycling of organic manure, which is generated in increasing quantities in fast-growing industries such as broiler chicken production, has become extremely significant. The European Union also encourages the application of organic fertilizers through the European Green Deal, which one of the aims to minimize chemical fertilizer use and increase the use of organic fertilizers.

In the present study, the treatment and application of broiler chicken manure was investigated from an environmental standpoint, using the life cycle assessment methodology (ISO 14040:2006) and including three impact categories (global warming potential (GWP), acidification potential (AP), eutrophication potential (EP)). In the first scenario, the environmental impact of the production of a composted and pelleted poultry litter (CPPL) product from a so-called Hosoya composting plant was evaluated. The environmental impact of producing CPPL in the amount necessary to supply a 100 ha area with nutrients was analysed, compared to the environmental impact of producing NPK fertilizer combinations (AN, CAN, urea, TSP, MAP, KCl) with the same active ingredient content. In the second scenario, the environmental impact on maize production was assessed when nutrient replenishment was carried out with CPPL and NPK fertilizer combinations.

Based on the results of the first scenario, the environmental impact of producing the CPPL is similar for GWP and higher for AP and EP than for the NPK fertilizer combinations. But need to considering that the same amount of NPK active substance requires a much larger amount of broiler chicken manure to be processed than the amount of chemical fertilizer to be produced. In contrast, in the second scenario a much lower environmental impact was already observed for GWP, AP and EP when the nutrient supplementation was done with CPPL in maize production.

Overall, the results indicate that CPPL can be viable alternative to chemical fertilizers, not just from an environmental standpoint but from financially due to continuously rising fertilizer prices.

Keywords: life cycle assessment, broiler chicken manure, Hosoya composting system, environmental impact

Introduction

The manure and other organic materials (e.g. compost, meat, bone and feather meal, etc.) that are not useful for livestock production technologies, can play an essential part in soil resource replenishment and even serve as a viable alternative to fertilizers (Moyo and Swanepoel, 2010; Mézes et al., 2015; Magnusson, 2016; He et al., 2016, 2020; Gorliczay et al., 2021). The issue of how to use the increased amount of manure has become increasingly important in recent years not only from an environmental but also from a circular economy perspective, thanks to fast-growing livestock sectors such as broiler farming (Chia et al., 2019; Nalunga et al., 2021). The livestock sectors are expected to become even more important in the future to meet the food needs of a growing population (Kasule et al., 2014; Enahoro et al., 2018; Van Harn et al., 2019; Janković et al., 2020).

To protect and preserve the environment and natural resources, the Common Agricultural Policy (CAP) introduced greening in 2015, which refers to agricultural practices that are environmentally beneficial

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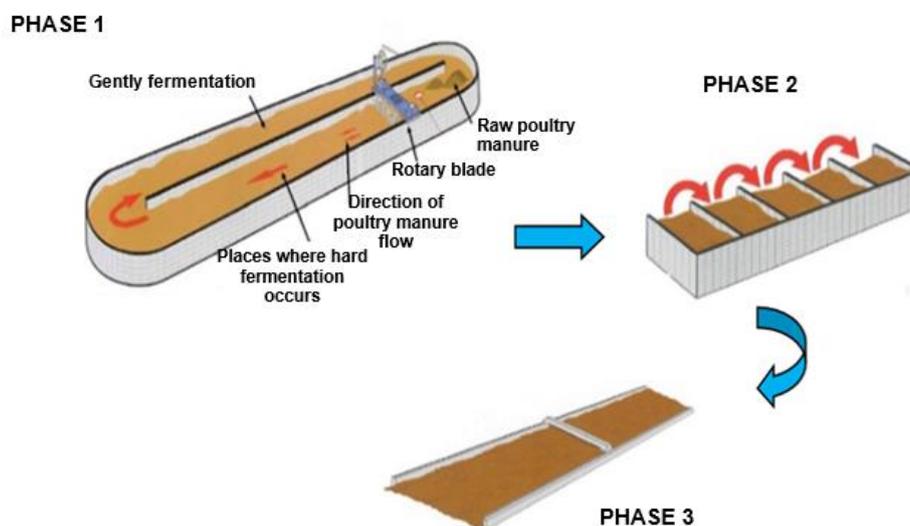
and less damaging to the environment. The European Union also introduced the European Green Deal (EU Green Deal) to comprehensively address environmental problems, with the main goal of making Europe climate neutral and sustainable by 2050 (Internet1). Among the objectives of the agreement concerning agriculture, the efforts to reduce the use of fertilizers and to favour the use of organic fertilizers are very important. Although fertilizers provide nutrients to vegetation quickly, in large quantities, and in easily accessible forms (Xiaoyu et al., 2013; Han et al., 2016; Bhatt et al., 2019; Versino et al., 2019; Gil-Ortiz et al., 2020), their use can have a number of negative environmental consequences. Excess fertilization, for example, increases the decomposition of soil organic matter, resulting in soil structure degradation, as well as polluting water bodies, resulting in leaching and acidification (Bíró et al., 1998; Savci, 2012; Gil-Ortiz et al., 2020; Messiga et al., 2020).

The most well-known form of manure recycling is material utilisation, which is not new because organic manures from animal husbandry have long been used as a nutrient replacement in crop production. In Hungary, until the first third of the 1900s, only manure was used to replace the nutrients taken up by plants, but due to intensive farming - and the introduction of fertilizers with higher active ingredient content - their use was pushed to the background. However, it is critical that organic manure be properly treated and disposed of before usage, as untreated manure is extremely harmful, containing numerous microorganisms that can pose animals and humans, as well as contaminate food and cause epidemics. Many foodborne diseases are associated to manure, either directly or indirectly, over the world (Garcia et al., 2010; Heredia and García, 2018). The issue of manure management is therefore becoming increasingly urgent not only from an environmental but also from a human health perspective. Due to the current uncertain fertilizer situation and high fertilizer prices, the substitution of fertilizers must now be considered from an economic standpoint in order to assure crop security.

One possible method of manure management is aerobic composting, which is a well-known and long-established method for the disposal of organic wastes and by-products (Filep, 1999; Modderman, 2020). Just a few literatures mention the composting of poultry manure, since poultry manure is rich in fibre and nitrogen and has a high moisture content, characteristics that are not conducive to composting. Georgakakis and Krintas (2000) mention two systems of Japanese origin, Okada and Hosoya, for composting by-products with these less favourable characteristics. In this research one of the scenarios is to investigate the environmental impact of this Hosoya composting system.

The technology covers a three-phase system consisting of two-phase aerobic fermentation and one-phase final drying (Figure 1). A granulate with a dry matter content of 80-85% is formed at the end of the process (Internet2; Csiba and Fenyvesi, 2012; Szabó, 2016), hereinafter CPPL (composted and pelletized poultry litter). The heat treatment removes toxic ammonia gases, weed seeds, and pathogenic microorganisms in the granulated goods acquired this way (Gaál, 2011).

Figure 1. Phases of the Hosoya composting system



A comparative analysis of the substitutability of fertilizers with CPPL was carried out based on the environmental burden of CPPL and fertilizer production and its application (crop production). The following fertilizers were included in the analysis: ammonium nitrate (AN), calcium ammonium nitrate (CAN), urea, triple superphosphate (TSP), monoammonium phosphate (MAP) and potassium chloride (KCl). As a research method, ISO14044:2006, "Environmental management. Life cycle assessment" was used for the analysis. Life cycle assessment is a suitable method for identifying and monitoring the main environmental pressures and critical points in the life cycle of a product.

Material and method

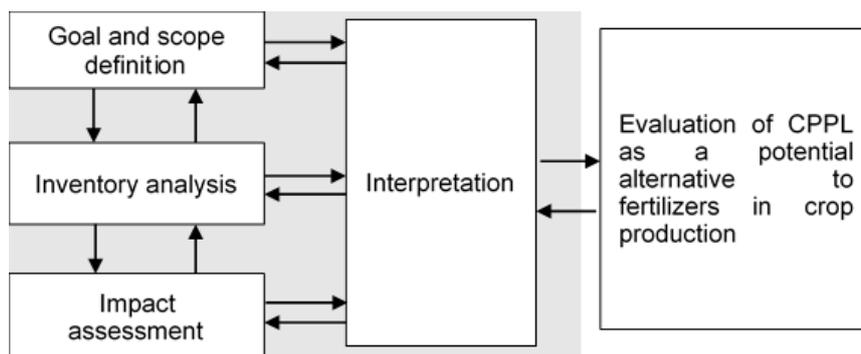
A life cycle assessment should be structured according to the following main steps, as recommended by the ISO 14040:2006 standard (Figure 2):

1. Definition of the goal and scope of LCA
2. Life Cycle Inventory Analysis
3. The Life Cycle Impact Assessment

Source: Internet3

4. Methods for the interpretation of LCA results

Figure 2. Steps of life cycle assessment (adopted from ISO14040:2006)



Definition of the goal and scope of LCA

The goal of the assessment, the scope (system boundaries), and the functional unit are all defined at the start of the life cycle assessment.

The goal of the life cycle assessment of the Hosoya composting plant

One of the goals of this study is to assess the role of CPPL as a potential chemical fertilizer alternative.

Environmental impacts during the production of CPPL in the Hosoya composting plant and during the production of chemical fertilizers should be identified and evaluated in order to provide a more accurate comparison. In this scenario, the environmental impacts of the amount of CPPL and chemical fertilizers needed to replenish the nutrients in a 100 ha field were assessed. Based on the suggestion of the product's manufacturer and Szabó et al. (2019) an application rate of 1.5 t/ha was calculated for CPPL. The amount of chemical fertilizers to be applied were calculated as a percentage of the 1.5 t/ha CPPL N, P₂O₅ and K₂O active substance content. To identify the system boundaries, only on-farm processes were considered.

The goal of the life cycle assessment of the maize production

Another goal of the study was to assess the environmental impact of 1 tonne of maize cultivation and to identify the critical points of cultivation technology. For this stage of the life cycle assessment, a scenario was considered where nutrient addition was either with 1.5 t/ha CPPL or with combinations of NPK fertilizers with the same active ingredient content of N, P₂O₅ and K₂O as 1.5 t/ha CPPL. 1 tonne of harvested maize served as the functional unit.

Life Cycle Inventory Analysis

The second step of the LCA is the life cycle inventory analysis, which quantifies the inputs and outputs that occur during the life cycle, which include raw materials and emissions.

The life cycle inventory analysis of the production of CPPL (Hosoya composting plant) and fertilizers

The composting plant provided some of the input data for the life cycle inventory assessment (manure and sludge, water, and fuel), while the rest was based on our own estimates (electricity, emissions). The quantities were first converted to one loading of a Hosoya tub based on the plant's data. Finally, based on the existing data, the values were converted to the material and energy flows needed to produce 1 kg of CPPL, for easier comparison later. These details were entered into the openLCA software, which was utilized to do the life cycle assessment. Based on the data in Table 1, 1 kg of CPPL requires 1.3 kg of wet manure, 0.033 kg of sewage sludge, and 0.067 l of water.

The material and energy flows needed to assess the environmental impact of fertilizers were provided by the OpenLCA software, within that the Agribalyse database. The assessment of the environmental impact of fertilizers was based on the production in the factory, so the assessment included the raw materials (e.g. ammonia for AN, CAN, urea and MAP fertilizers; dolomite and nitric acid for CAN fertilizer; phosphate rock for TSP and MAP; phosphoric acid for TSP; potash for KCl fertilizer), electricity, heating, water, packaging material, etc.

The life cycle inventory analysis of the maize production

For maize production, the inventory includes the field operations (tillage, nutrient replenishment, basic tillage, basic tillage drilling, seedbed preparation, sowing, crop protection, harvesting), the machinery needed for these operations, and all inputs such as seeds, CPPL or NPK fertilizers, pesticides, etc. The process run in the software also considers emissions from fuel combustion. The inventory is limited in time from 'harvest to harvest', but does not take into account post-harvest processes such as drying or storage, even if these operations were also carried out on the farm.

Table 1. Life cycle inventory analysis of Hosoya composting plant

Input material and energy flows	kg/CPPL
Broiler manure and litter (with sludge)	1.338 kg
Water	0.067 l
Electricity	0.45 MJ
Natural gas	0.087 MJ
Output anyag- és energiaáramok	
CPPL	1 kg
Emission to air:	
NH ₄	0.0012 kg
N ₂ O	0.00006 kg
CH ₄	0.0001 kg

Life cycle impact assessment

The Life cycle impact assessment (LCIA) stage involves processing and evaluating the data collected during the inventory analysis.

In practice, life cycle assessments are carried out using software. The OpenLCA software was chosen for this assessment because it provides a complete set of material and energy flows for all levels of analysis. The software was created in 2006 by a German software development company, Greendelta, with the intention to provide a reliable and powerful software for life cycle assessment. The software is free to download and use. The OpenLCA developers are continuously improving the software, which allows flexible modelling for simple models (Internet4).

The analyses were conducted using the free Agribalyse database, which contains a substantial quantity of data for all of the required analyses (Colomb et al., 2015; Koch and Salou, 2020; Asselin-Balençon et al., 2020).

In this study, the CML IA baseline impact assessment method was used, which is internationally accepted and very widely used. This method was created at Leiden University in the Netherlands in 1992 and its name is derived from the acronym Centrum voor Milieukunde (CML) (Gabathuler, 2006). The most significant impact of the CML methodology is in the area of 'impact assessment'. The CML methodology aims to quantify all direct material and energy exchange relationships between the environment and the product system. The methodology is based on the assumption that emissions with the same effect can be summed across different media, on the other hand, on an impact-oriented classification of material and energy flows. The methodology is in line with international standardisation efforts as it includes goal setting (target and scope), life cycle inventory (inventory analysis), impact analysis (impact assessment) and evaluation (interpretation of results) (Gabathuler, 2006). The CML IA baseline impact assessment method evaluates the processes and products under consideration based on the 11 most commonly used impact categories of life cycle interpretation (Guinée et al., 2002). The three most often utilized impact categories in the literature were used to interpret the current life cycle.

a) Acidification potential (AP). Acidification potential is usually characterized by kg SO₂-equivalence. Acidification potential refers to the compounds that are precursors to acid rain. These include sulphur dioxide (SO₂), nitrogen oxides (NO_x), nitrogen monoxide (NO), nitrogen dioxide (N₂O), and other various substances. These acid gases are usually released into the atmosphere because of fuel combustion. These gases are oxidised in the atmosphere to form sulphuric acid, sulphuric acids and nitric acid, which reduce the pH of precipitation (Guinée et al., 2002).

b) Eutrophication potential (EP). Eutrophication potential is usually characterized by kg PO₄-equivalence. Numerous marine and freshwater ecosystems have been harmed by eutrophication. Excessive growth of algae and plants is caused by increased availability of one or more limiting growth factors (for example, overfertilization or excessive nutrient delivery, with an emphasis on nutrients, especially nitrogen (N) and phosphorus (P)) (Guinée et al., 2002).

c) Global warming potential (GWP). Global warming potential is usually characterized by CO₂-equivalence. Carbon dioxide (CO₂), methane (CH₄), and chlorofluorocarbons (CFCs) are the most frequent greenhouse gases (CFCs). Carbon is present in all of the GHGs. The global warming potential (GWP) is a metric used to compare the effects of various gases on the environment. It is a measure of how much a particular gas, such as 1 tonne, warms the atmosphere over a specific time period (20, 50, or 100 years) as compared to the emission of 1 tonne of carbon dioxide. The higher the GWP, the more negative it is for the environment (Guinée, 2002; IPCC, 2013).

4. Interpretation of LCA results

The interpretation of the life cycle involves interpreting the results and findings from the previous two steps (life cycle inventory analysis (2nd step) and life cycle impact assessment (3rd step)). After the interpretation and evaluation of the results, proposals are formulated. The interpretation phase is also responsible for presenting the inventory analysis results in an intelligible and complete manner in accordance with the study's objectives. The process of interpretation can be used to identify, qualify, and assess conclusions drawn from LCA and LCIA investigations (Muralikrishna and Manickam, 2017; Farjana et al., 2021).

In this study during the interpretation of the LCA results, comparative analyses were carried out to assess the environmental impacts of CPPL. In the first scenario the environmental impact of producing

the nutrient supply of a one hundred (100) hectare field was assessed and evaluated. The production of one hundred and fifty tonne (150 t) CPPL was compared to the production of the equivalent macro-element contents of the nitrogen, phosphate and potassium fertilizers combined.

The amount of CPPL to be applied was determined as 1.5 t/ha based on the recommendation of the company producing the product and Szabó et al. (2019). Finally, the amount of each fertilizer to be applied was determined according to the active ingredient content (N-, P₂O₅- and K₂O-content) of CPPL applied at a dose of 1.5 t/ha (Table 2).

Table 2. Quantity of NPK fertilizers to be applied per 100 ha as a function of the active substance content of CPPL

Product	Quantity (t/100 ha)
CPPL (composted and pelletized poultry litter)	150
AN (ammonium nitrate)	24.6/21.5 *
CAN (calcium ammonium nitrate)	30.5/26.7 *
Urea	18/15.7 *
TSP (triple superphosphate)	9.6
MAP (monoammonium phosphate)	8.6
KCl (potassium chloride)	6.25

* Amount of N fertilizers to be applied if the P fertilizer is MAP (considering the N content of MAP)

Since CPPL is a complex active ingredient product containing a combination of both macro and micro elements, the fertilizers were also applied in combination in the scenario. The different fertilizer combinations were as follows, according to the active ingredient content of CPPL (Table 3):

Table 3. Combinations of N, P, K fertilizers and total amount to be applied per 100 hectares

Name of combinations	Composition of NPK combination	t/100 hectare
NPK1	AN + TSP + KCl	40.45
NPK2	AN + MAP + KCl	36.35
NPK3	CAN + TSP + KCl	46.15
NPK4	CAN + MAP + KCl	41.51
NPK5	Urea + TSP + KCl	33.85
NPK6	Urea + MAP + KCl	30.59

According to their environmental impact, the results of the life-cycle evaluation were divided into three categories (low, medium, and high). The three categories were defined by dividing the difference between the maximum and minimum values for each impact category into three equal intervals.

Results and discussion

Interpretation of LCA results of the production of CPPL (Hosoya composting plant) and fertilizers

The environmental impacts of producing CPPL and various fertilizers were first evaluated per kilogram of end product (Table 4).

Table 4. Results for the production of 1 kg end product

Impact categories	CPPL	AN	CAN	Urea	TSP	MAP	KCl
Acidification potential (kg SO ₂ -equivalent)	0.024	0.006	0.005	0.005	0.010	0.003	0.002
Eutrophication potential (kg PO ₄ -equivalent)	0.005	0.002	0.002	0.002	0.004	0.002	0.001
Global warming potential (kg CO ₂ -equivalent)	0.273	1.382	1.137	1.127	0.657	0.826	0.399

The acidification potential and eutrophication potential, had higher emissions when producing CPPL. The value of acidification potential ranges between 0.002 and 0.01 kg SO₂-equivalent/kg product, regardless of the type of fertilizer. Among the fertilizers, KCl fertilizer had the lowest emission while TSP fertilizer had the greatest emission. Steam generation and extraction and processing of raw materials (SO₂ emission) were the most significant contributing processes for the former, whereas H₂SO₄ production was the most significant contributor for the latter. CPPL (0.024 kg SO₂-equivalent/kg product) produced 93% more emissions than KCl and 58% more emissions than TSP. The high acidification potential value in CPPL is attributed to NH₃ emissions from manure processing. HNO₃ generation (NH₃ and NO emission) for AN and CAN fertilizers, steam production and raw material extraction and processing (SO₂ and NH₃ emission) for urea, and electricity consumption and raw material extraction (SO₂ and NH₃ emission) for MAP fertilizers were the processes that contributed to acidification potential.

A similar trend was observed for emissions in terms of eutrophication potential, the lowest emissions were found for KCl fertilizer (0.0007 kg PO₄-eq/kg KCl) and the highest for TSP (0.0041 kg PO₄-equivalent/kg TSP). The release of phosphate and phosphorus into water during the extraction and processing of raw materials was the source of emissions for both. The eutrophication potential of CPPL was 0.0054 kg PO₄-equivalent, which is 88% higher for the former and 24% higher for the latter fertilizer. In this case, NH₃ and N₂O emissions during the processing of broiler manure and electricity consumption were the contributors to the high environmental load. For the other fertilizers, the contributing processes were similar to those for acidification potential. For AN and CAN fertilizers, HNO₃ production (NH₃ and NO_x emission) and for urea and MAP, extraction and processing of raw materials (PO₄ and NH₃ emission) were the contributing processes of eutrophication potential.

The global warming potential was lowest for CPPL (0.27 kg CO₂-equivalent/kg product). Contributing to emissions were electricity consumption (CO₂ and CH₄ emission), broiler manure processing (N₂O and CH₄ emission), fuel consumption (CO₂ emission) and further treatment of waste generated (CO₂ emission). Among fertilizers, KCl production again had the lowest emissions (0.4 kg CO₂ equivalent/kg KCl). The highest emissions occurred for N fertilizers, and the most important of these was for AN (1.38 kg CO₂-equivalent/kg AN). The production of AN produces five times as many emissions as CPPL. For fertilizers, CO₂ and CH₄ emissions due to the production of steam for fertilizer production are almost uniformly responsible for the high GWP. There is no information on the environmental impacts of producing CPPL using the Hosoya technology; instead, there is literature on similar semi-enclosed and closed composting technologies. Among the different animal manures, Zhu et al. (2014) investigated the composting of chicken manure and litter carcasses. The CO₂ emissions of the system they studied were 3-6 times lower than the Hosoya system. The ADAME (2012) research programme investigated air emissions from composting. The composting of sewage sludge investigated under this study had emissions of 0.089 and 0.298 kg CO₂-equivalent. The latter value is the closest to the 0.27 kg CO₂-equivalent observed for granulated poultry manure. The emissions from composting of livestock waste were also investigated, where the measured values are on average five times higher than the emission value reported in this study. Luske (2010) studied the composting of chicken and beef manure. The emissions of the composting plant he studied were about half (0.147 kg CO₂-equivalent/kg product) of those of the Hosoya composting plant. In general, the authors found that the emissions depend to a large extent on the composition and proportion of the raw materials to be composted and the composting technology.

Overall, because of the gas emissions emitted during manure composting, the acidification and eutrophication potential of CPPL is larger than that of fertilizers, as shown in Table 4. The global warming potential, on the other hand, was lowest during the manufacture of 1 kg CPPL.

The environmental impact of producing a fertilizer supply for a 100 hectare field was studied and evaluated (Table 5) after determining the environmental load per 1 kg of product. A combination of NPK fertilizers was used to compare the output of 150 t of CPPL.

Compared to the NPK fertilizer combinations, the environmental impact of 150 t of CPPL production was higher in terms of the AP (94% on average) and the EP (90% on average). The possible reason for this in the case of AP is the NH₃- and N₂O-emission of organic manure during the composting process, while the high EP is due to NO₃⁻ and PO₄⁻ emissions also during the composting process. Because of the emissions of gases during the composting of organic matter, the production of CPPL may obviously be categorized as having a high environmental impact in terms of acidification and eutrophication potential.

Table 5. Results for the production of CPPL and NPK fertilizers combinations applied for a 100 hectare of arable land

Impact categories	CPPL	NPK1	NPK2	NPK3	NPK4	NPK5	NPK6
Acidification potential (kg SO ₂ -equivalent)	3620	262.9	173.3	265.3	175.3	196.0	115.6
Eutrophication potential (kg PO ₄ -equivalent)	816.1	98.7	65.8	101.0	67.7	75.8	46.1
Global warming potential (kg CO ₂ -equivalent)	40880	43005	39357	43654	39886	29113	27372

green = low environmental impact; yellow = middle environmental impact; red = high environmental impact

In the case of GWP, comparison to the NPK1 and NPK3 combinations the CPPL produced a smaller global warming potential by 5.5% on average, while the to the NPK2 and NPK4 combinations the CPPL's GWP values were similar. The production of the combinations NPK1 and NPK3 had the highest environmental load, while the production of the combinations NPK2 and NPK4, together with CPPL, belonged to the medium environmental load group. The GWP of those NPK combinations where the N fertilizer was urea (NPK5 and NPK6) was 29–33% lower than CPPL due to low environmental impact of urea production, because urea is the most concentrated nitrogen fertilizer (46% N content) and smaller amounts of it cover the desired quantity. As a result, the production of NPK5 and NPK6 combinations had the lowest environmental burden.

Overall, the results in Table 5, similar to the results in Table 4, indicate that CPPL production has higher acidification and eutrophication potential than NPK fertilizer combinations due to the gases released during manure composting. In terms of global warming potential, the production of 150 t of CPPL falls into the same category of medium environmental impact as the NPK2 and NPK4 combinations. Resulting in a lower environmental burden than NPK1 and NPK3 combinations.

Interpretation of LCA results of the maize production

Continuing with the previous scenario, in the case of maize cultivation's life cycle assessment, 150 t CPPL and the six NPK fertilizer combinations were utilized for nutrient replenishment. So that, in addition to the environmental impact of maize cultivation, the production of CPPL and fertilizers was also taken into account. The environmental impact of maize production was also divided into three categories (low, medium and high environmental burden). The environmental burden was calculated using 1 tonne of harvested crop.

Table 6. Results for maize production (1 tonne) with various nutrient replenishment

Impact categories	CPPL	NPK1	NPK2	NPK3	NPK4	NPK5	NPK6
Acidification potential (kg SO ₂ -equivalent)	9.06	15.28	15.19	15.28	15.19	15.2	15.11

Eutrophication potential (kg PO ₄ -equivalent)	8.79	10.46	10.42	10.47	10.42	10.44	10.39
Global warming potential (kg CO ₂ -equivalent)	644.7	928.4	924.5	928.6	926	975.5	972.9

green = low environmental impact; yellow = middle environmental impact; red = high environmental impact

Field operations and fertilizer use are the two main contributions to acidification potential. This explains why, although emissions in the fertilizer scenarios reach 15 kg SO₂-equivalent per 1 tonne of maize, emissions in the CPPL barely exceed 9 kg SO₂-equivalent per 1 tonne of maize. The type of heavy machinery utilized for each field operation, as well as the type of fertilizer used, have a significant impact on emissions. Holka et al. (2017), for example, found 6.6 and 7.9 kg SO₂-equivalent when comparing two systems in Poland.

Field operations and fertilizer use, like acidification potential, are the key contributors to eutrophication potential. Also, for eutrophication potential, the lowest emissions (8.79 kg PO₄-equivalent) were found where nutrient addition was done with CPPL. In this case, emissions were about 16% lower than in maize production scenarios where NPK fertilizers combination were applied.

The global warming potential for maize production with CPPL was 644.7 kg CO₂-equivalent per tonne of maize, while for NPK combinations it was much higher, ranging from 924.5 to 975.5 kg CO₂-equivalent. The two highest values were for NPK5 and NPK6 combinations, probably due to the fact that the N fertilizer in these cases was urea. As with acidification and eutrophication potential, the largest contributors to emissions for this impact category are field operations and fuel use. The majority of the literature is available on GWP.

The literature data are very variable and generally lower than those measured in the present study, which can be explained by the fact that most of the studies investigated non-irrigated conditions, whereas in this study irrigated cropping systems were considered, which includes the operation of the whole irrigation infrastructure from water purchase to irrigation. Wittman et al. (2011) found values of 319.7 and 488 kg CO₂-equivalent/t maize in their research. They concluded that the main contributor to greenhouse gas emissions is the loss of soil organic carbon (40-61%), followed by NO₂ emissions (10-31%) and finally field operations, the most important of which is harvesting (14-22%). Holka et al. (2017) measured 296.8 and 331.1 kg CO₂-equivalent in a comparison of two maize production systems in Poland. In another study, Holka and Bienkowski (2020) compared the CO₂-equivalent emissions of three tillage systems, conventional, reduced and no-tillage. Their results showed no major differences between the systems, with values around 184.8, 189.8 and 178.0 kg CO₂-equivalent/t maize, respectively. Jayasundara et al. (2014) measured 243 and 353 kg CO₂-equivalent, while Supasri et al. (2020) estimated greenhouse gas emissions at 351.2 kg CO₂-equivalent. Among the researchers, Wettstein et al. (2017) compared irrigated and non-irrigated maize cropping systems. Their results show that non-irrigated maize production has emissions of 490 kg CO₂-equivalent per tonne of maize, while irrigated systems have much higher emissions of between 530 and 800 kg CO₂-equivalent.

The results shown could be important for improving good practices in crop production, even in support of policy decisions, thereby reducing environmental problems such as GHG emissions and air pollution. Based on the results of this life cycle assessment, it can be concluded that a substantial reduction in pesticide and fertilizer use is needed to achieve sustainability and reduce environmental pressures. Other solutions include the introduction of reduced tillage systems and the use of single-tillage operations, which would reduce fossil fuel use and greenhouse gas emissions. Emissions could be significantly improved by using more modern machinery and equipment for field operations. Of course, modern technologies and infrastructure are very expensive to install, and in most cases can only be financed through grants.

Conclusion

As a final conclusion, the use of manure-based products should be considered for both environmental and economic reasons.

From an environmental point of view, because it is a valuable nutrient substitute which, when used, does not pollute or contaminate the environment. Although the production of CPPL has a higher acidification and eutrophication potential due to the processing of organic matter, the global warming potential is much more favourable than that of fertilizers. And the environmental impact of crop production is clearly lower with CPPL. The use of fertilizer-based products makes the farm environmentally sustainable and creates a circular economic structure.

From an economic point of view, in the current uncertain fertilizer situation and fertilizer prices (due to high natural gas prices), substitution of fertilizers should be considered to ensure crop security and to meet human and animal nutritional needs, as there is a worldwide shortage of fertilizers, despite the fact that fertilizers were already at record prices last year. This is mainly due to the sharp rise in the price of the main raw material, natural gas, and the resulting decisions to cut production. Several European fertilizer producers, including Yara International ASA and Borealis AG, are cutting production as a result of the rise in natural gas prices. This move further increases the risk of global food shortages. And with Russia's recent announcement to suspend fertilizer exports, the Russia-Ukraine war has completely disrupted commodity markets and pushed up the price of natural gas, a raw material for nitrogen fertilizers, to record levels. This price rise, in turn, is forcing European producers to cut ammonia production, increasing the already high input costs for agricultural businesses and further increasing the risk of global food shock.

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Internet4: www.openlca.org

Correlation of innovativeness and impact on sustainability (SDG) at the universities of Europe

DOI: [10.29180/9786156342386_11](https://doi.org/10.29180/9786156342386_11)

Abstract

The **objective** of the paper is to present the results of secondary research on the connection between the innovativeness of European universities and their impact on the Sustainable Development Goals. The **methodology** is the correlation analysis of the combined data retrieved from publicly available lists.

The **hypotheses**, that for the universities both factors should be in focus, moreover more innovative universities might have stronger contributions to the SDGs, this research was not able to prove. This is not in line with previous research about the correlation of innovation and sustainability. As any diversity, this raised the question of why, for which some answers were found.

As some of the lists the research was based on are self-reporting ones, one of the factors can be, that universities do not yet consider it important to be part of the lists. For the society and for the economy it would be **useful** to have more precise information about the universities' impact on the SDGs, which can be achieved by having more and more accurate data from the universities and/or the creation of more descriptive indicators, which illustrates the relationship of the two factors better, is a possibility.

The **originality** of the research is that to my best knowledge no other research was yet on the relation of these two indicators of the European universities, although because of the limited data, a new analysis was implemented based on Google searches. The results are still not convincing that innovation and sustainability are connected at the universities.

Keywords: Sustainability, SDG, impact, innovation, university, higher-education, Europe, correlation

Introduction

As universities started to develop, we could follow the phases of focus on (1) education, (2) research at the Humboldtian university, and (3) the third mission (Etzkowitz, H., 1983; Etzkowitz, Henry, Webster, Gebhardt, & Terra, 2000; Compagnucci & Spigarelli, 2020) in which the aim is to keep contact with the other actors – mainly within the innovation ecosystem – to contribute to the society. Now we can witness the phase of University 4.0, when the growing importance of sustainability comes to the forefront, which means an even bigger contribution to the society via all the three functions (Lozano et al., 2015; Secundo, Dumay, Schiuma, & Passiante, 2016; Staniškis, 2016). This leads to sustainable entrepreneurial universities, which can educate the sustainable entrepreneurs of the future, which is an important step in the transition to a sustainable economy.

Research on this topic is wide, for example, the table of Giesenbauer & Müller-Christ (2020) on the four phases of the universities summarizes the specifications of the different phases based on the literature (what is in the focus, what is education, research, and the governance, operations and culture like).

As our world is facing challenges not only economically, but environmentally (climate change) and socially, humanity tries to find innovative solutions for the most urging problems. In 2015 during the session of the United Nations (UN) 190 countries signed the resolution on Transforming our world: the 2030 Agenda for Sustainable Development (United Nations, 2015). This document grouped the challenges of sustainability into 17 categories. Since 2019, there is a possibility for the universities to report on these challenges to communicate their performance to society (Impact ranking.2021).

¹⁷ University of Debrecen, Károly Ihrig Doctoral School of Management and Business, e-mail address: gregan.orsolya@unideb.hu, gregan.orsolya@gmail.com

We know for a long time that there is a connection between innovation and sustainability (Vollenbroek, 2002), even if the available literature is very little, although increasing (Ávila et al., 2017; Wagner, Schaltegger, Hansen, & Fichter, 2021). More to be found in the grey literature (publications of different organisations like the UN or the EUA).

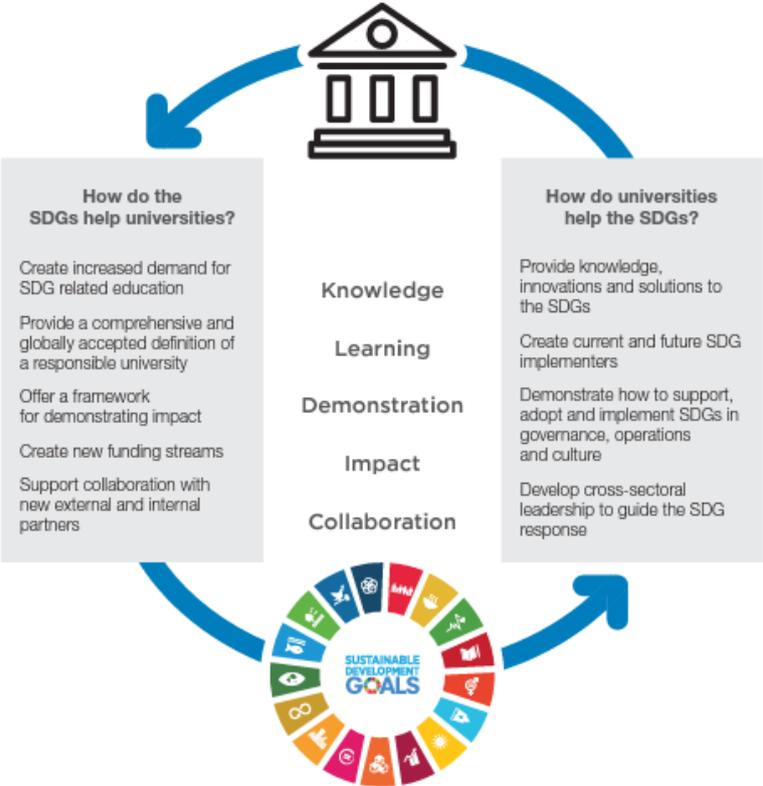
Universities are organized around knowledge. They are the training places of the future’s decision-makers (share of the knowledge), the research is about the creation of the knowledge, while the third mission is about the exploitation of the knowledge (Wallin, 2007). Sustainability is a topic that requires knowledge, too, this is the reason, why universities could become key players in the sustainable innovation ecosystem. Knowledge is the link between innovation and sustainability and the “triple-helix twins” – innovation and sustainability - balance each other (Etzkowitz, Henry & Zhou, 2006; Zhou & Etzkowitz, 2021) or can even strengthen each other (for which the use of the renewables is a good example). Sustainable entrepreneurship is an emerging topic as it becomes evident that being economic and sustainable are not necessarily conflicting objectives (Klofsten et al., 2019). Entrepreneurship is kind of a synonym of innovation at the universities.

Among the firsts (Gerlach, 2003) stated sustainable development as a multi-innovation process, and from this perspective sustainable development is based on successful innovation management.

We also have to deal with the fact that definitions are changing and researchers do not always use the same definitions. In 2011 (Schaltegger & Wagner) the differences of sustainability-oriented entrepreneurship at companies (ecopreneurship, social entrepreneurship, institutional entrepreneurship, and sustainable entrepreneurship) got summarized, which clearly represented the overlapping of the existing definitions.

Even some UN organisations analysed the role of universities in achieving the SDGs (

Figure 1. The case for university engagement in the SDGs



Source: (Kestin et al., 2017)

Based on Figure 1., it is evident that universities are key actors in reaching the sustainable development goals. They provide knowledge, innovations and solutions to the SDGs; they create the current and future implementers of the SDGs; they demonstrate how to support, adopt and implement SDGs in governance, operations and culture, and they develop cross-sectoral leadership to guide the SDG response.

But we cannot forget about the fact that SDGs help the universities, too. SDGs create an increased demand for SDG-related education; provide a comprehensive and globally accepted definition of a responsible university; offer a framework for demonstrating impact; create new funding schemes; support collaboration with new external and internal partners.

The concept of sustainable entrepreneurial ecosystems is an emerging one, while some universities still struggle to be simply an entrepreneurial university. It is a question if universities can find a way to 'skip' the older concept and this way make their entrepreneurial activities (including education, research, and innovation management) more sustainable.

Sustainable innovation is not only an emerging, but also a fragmented topic (Cillo, Petruzzelli, Ardito, & Del Giudice, 2019), which means that there are at least three main perspectives for analysing the topic (performance evaluation, internal-managerial, and external-relational).

The role of universities in sustainability is known for a long time – at least since the Talloires Declaration, which was signed by 500+ university managers since 1990 – and the report and the event titled 'Universities as key contributors to sustainable innovation ecosystems' of the European University Association (EUN) also have to be mentioned as a signal of the recognition of the growing importance of the topic (Kozirog, Lucaci, & Berghmans, 2022). In spite of this, to the best of the author's knowledge, no research was yet implemented if there is a correlation between the level of innovativeness and sustainability of universities. The closest one is a literature review of the business context of the two phenomena (Cordova & Celone, 2019)

In this research, we tried to analyse the correlation of innovativeness as the indicator of entrepreneurship and the impact on SDGs as the indicator of sustainability at the universities of Europe. When we are analyzing the European universities in this research we focus not only on the universities of the European Union but Norway, Switzerland, and Turkey are also included.

The hypothesis of the research is that there is a correlation between the innovativeness and the impact on the sustainability of the European universities, like more innovative universities have a larger impact on sustainability. The root of this assumption is that both innovation and sustainability are based on knowledge.

After this introductory part, the rest of this manuscript is structured like Section 2 presents the method used for the analysis, Section 3 describes the results, while Section 4 summarizes the most important conclusions of the research.

Method

Based on the literature it is clear that the innovativeness of a university represents how entrepreneurial it is (Etzkowitz, Henry, 2016). It is more and more important what impact a university has on the SDGs. The missing point we realized if there is a connection between the innovativeness of a university and its impact on the Sustainability Development Goals of the United Nations (2015), although the nexus of contextualization of entrepreneurship and sustainability was already raised in 2019 in the special issue of the Small Business Economics (Volkman, Fichter, Klofsten, & Audretsch, 2021). In 2021 the European University Association had an event titled 'Universities as key contributors to sustainable innovation ecosystems', which shows that the importance of innovation and sustainability should already be hand-in-hand. The event was based on the publication titled 'Universities as key drivers of sustainable innovation ecosystems' (Kozirog et al., 2022).

That is why this research focuses on the state-of-the-art and the relation between these two factors.

The research covers only the universities of Europe as (1) the US differs from Europe in innovation environment and management (Rybnicek, 2020), (2) Europe and the European Union have declared sustainability among their most important goals in the European Green Deal (A european green deal -

striving to be the first climate-neutral continent.2022).¹⁸ However, we used the data of the most innovative and most impactful US and UK universities as benchmark points in the later part of our analysis.

In this research, we used two publicly available, but not downloadable lists, where data collection was implemented by hand and Google searches to calculate the innovativeness and the impact of the universities.

The Reuters' list of the world's most innovative universities was used as an indicator of the entrepreneurial level of the university. The number of patents and the commercial impact are both important in predicting the innovativeness of a university (Lanjouw, Pakes, & Putnam, 1998; Sweet & Eterovic, 2019).

The Reuters'¹⁹ last available list of the 100 most innovative universities is from 2019 (David M., 2019) and the universities situated in continental Europe (no Irish university was on the list) were selected.

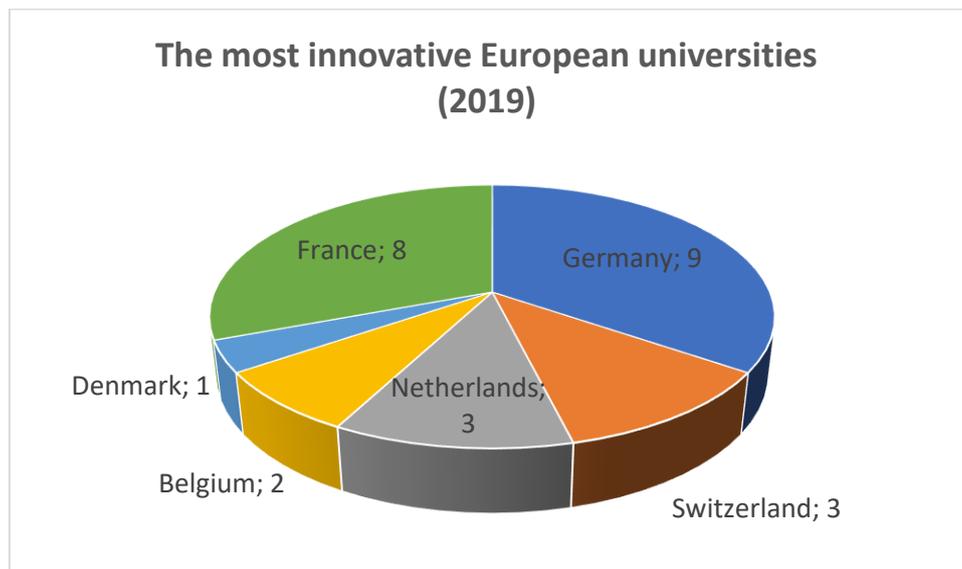
Then The Times Higher Education Impact Ranking on the 17 SDGs was hand-collected for the universities of Europe. We have to note that we finally included Ireland, which in this list means 9 universities, although Ireland is not situated in continental Europe, it is a member of the European Union.

During the research the two datasets were cross-checked and the data of the overlapping 5 universities were analysed by SPSS 22 to find the possible correlations between innovation- and sustainability indicators of the best performing universities. As 5 datasets are too small for a scientific analysis, the datasets were widened. To the data of all the European most innovative and most impactful universities the data of the most innovative and most impactful US and UK universities were added as benchmark points. Even kind of a content analysis was implemented based on Google searches and the analysis of the universities' English webpages. Also the existence of dedicated pages for our topics were studied.

Results

The Reuters'²⁰ last available list of the 100 most innovative universities (David M., 2019) contains 26 universities situated in continental Europe (no Irish university was on the list). 1. Table contains the list and the available data for the most innovative universities in Europe, while Figure shows the distribution of these universities in the European countries.

Figure 2. The most innovative universities in Europe by country (2019)



Source: own work based on the list of the most innovative universities (David M., 2019)

¹⁸ the first European Union Sustainable Development Strategy was formulated in 2001

¹⁹ <https://www.Reuters'.com/innovative-universities-2019>

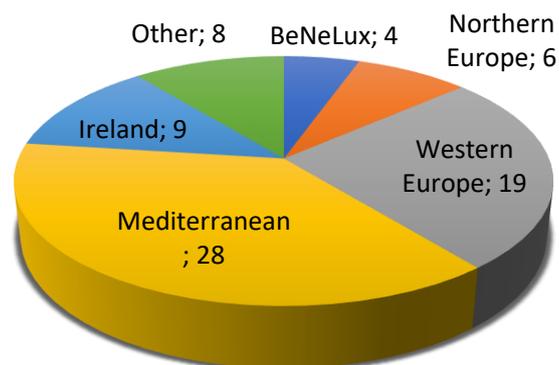
²⁰ <https://www.Reuters'.com/innovative-universities-2019>

Until 2019 there was no official list of the SDG impact of universities. Since then, the Times Higher Education (THE) prepares the annual list parallelly to its rankings. Although the number of the universities that send data is growing (De la Poza, Merello, Barberá, & Celani, 2021), being partly a self-reporting list does not make it possible to compare the universities without doubts.

The list of the Times Higher Education for impact²¹ (Impact ranking.2021) was analysed, where in the first 300 universities 74 were from Europe (hand-collection of data). **Hiba! A hivatkozási forrás nem található.** represents the distribution of the universities of Europe with the greatest reported impact on SDGs.

Figure 3. European universities with impact on SDGs (1-300)

Number of European Universities with impact on SDGs



Source: hand-collected from the list of The Times Higher Education Impact Ranking (2021) (Impact ranking.2021)

After the collection of the data from both the most innovative (26) and the most impactful (74) European universities, a comparison was made. As Table summarizes, only 5 of the most innovative European universities (26) were part of both lists (the Delft University of Technology is extraordinary, as it is not on the impact list although it is the best in SDG9), which even on its own means that this research is not able to justify the relation of innovativeness and sustainability at the universities.

This research has failed in justifying the relation between the innovativeness of a university and its impact on SDGs. This is in line with (Urdari, Farcas, & Tiron-Tudor, 2017), who found that international rankings fail to measure the HEIs success in developing third mission activities.

At that point the decision was made to analyse the data of all the universities together with some benchmarks from the US and the UK. This way data from the THE list (Number of FTE students, Female:Male ratio, Number of students per teacher and the proportion of international students) were collected. Besides, Google searches were implemented to have the data how many hits there are for the „name of the university” + „innovat*” or „sustain*”. The same search was done on the English main websites of each university and it was also analysed if the university has a dedicated page for the innovation and / or for sustainability. For the latter, three options were defined, yes /no / partly, where the latter meant that the keyword was connected to some other topic, most of the times it was research or impact.

It was interesting to see, that innovation still seems more important, as this term was more frequent on the websites of the universities (innovate* was almost twice as much hits as “sustain*”). 13/42 universities do have a dedicated website for innovation, 15/42 has partly (mostly joint with a research website) and 13 do not have any.

For sustainability 9/42 universities have a dedicated website, 5/42 got the label “partly” (mostly it was framed as impact) and 28 universities do not have a dedicated site for sustainability.

²¹ https://www.timeshighereducation.com/rankings/impact/2021/overall#!/page/0/length/-1/sort_by/rank/sort_order/asc/cols/undefined

Only four universities have a dedicated page for innovation and sustainability, two of which are our benchmark points (Oxford and Stanford). From Europe only the Delft University of Technology and the EPFL - Swiss Federal Institute of Technology Lausanne declares innovation and sustainability important enough to have a dedicated page for both.

Table 1. List of the most innovative European universities

Overall	Ranking in the Sustainable Development Goals (SDG) according to the Times Higher Education																	Innovation ranking https://www.reuters.com/innovative-universities-2019	Patents filed 2012-2017	Success rate of filed patents	Commercial Impact score	World ranking 2021			
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.								
Name of the University	Country	Ranking	Score	No poverty	Zero hunger	Good Health and Wellbeing	Quality Education	Gender Equality	Clean water and sanitation	Affordable and clean energy	Decent Work and Economic Growth	Industry, Innovation and Infrastructure	Reduced Inequalities	Sustainable Cities and Communities	Responsible Consumption and Production	Climate Action	Life below Water	Life on Land	Peace, Justice and Strong Institutions	Partnership for the Goals					
1. KU Leuven	Belgium	101 - 200	77,5 - 85,2	201-300	80	101-200	201-300	201-300	201-300	201-300	101-200	28	101-200	101-200	101-200	101-200	101-200	101-200	101-200	101-200	7.	305	40%	43,3	45
2. University of Erlangen Nuremberg	Germany	na																			14.	238	52,10%	51,2	198
3. EPFL - Swiss Federal Institute of Technology	Switzerland	na																			17.	235	39,60%	58,1	43
4. ETH Zurich	Switzerland	na																			40.	305	29,50%	42,7	14
5. University of Montpellier	France	201 - 300	71,0 - 77,4			60	53					201-300		101-200							44.	187	70,60%	27,9	301-350
6. Technical University of Munich	Germany	na																			46.	191	40,80%	40,5	41
7. Technical University of Denmark	Denmark	na																			48.	379	28,50%	36,4	187
8. University of Zurich	Switzerland	na																			51.	167	34,10%	35,8	73
9. Sorbonne University	France	201-300	71,0 - 77,4			201-300	401-600				52	201-300		98							56.	383	44,60%	31,7	87
10. Ruprecht Karl University Heidelberg	Germany	na																			59.	158	35,40%	34,4	42
11. Delft University of Technology	Netherlands	*								101-200		1									60.	147	73,50%	37,6	78
12. University of Paris Sud	France	na																			64.	170	54,70%	39,2	
13. University of Paris Descartes	France	na																			66.	219	32,90%	56,1	
14. Johannes Gutenberg University	Germany	na																			70.	93	38,70%	33,2	301-350
15. Leiden University	Netherlands	na																			71.	73	50,70%	41	70
16. University of Munich	Germany	na																			75.	100	40,00%	36,9	
17. University of Claude Bernard	France	na																			77.	343	59,80%	27,4	501-600
18. Dresden University of Technology	Germany	na																			79.	202	57,40%	31,6	152
19. University of Bordeaux	France	201-300				101-200	101-201	101-201	201-300			101-200	48	101-200	301-400	81	101-200				80.	205	54,60%	41,4	401-500
20. University of Freiburg	Germany	na																			82.	148	53,40%	38,8	83
21. RWTH Aachen University	Germany	na																			89.	160	44,40%	37,3	107
22. Grenoble Alpes University	France	na																			91.	155	66,50%	24,2	351-400
23. Utrecht University	Netherlands	na																			93.	74	41,90%	34,6	75
24. Technical University of Berlin	Germany	na																			94.	104	63,50%	38,4	140
25. University of Aix-Marseille	France	201 - 300	71,0 - 77,4	88	101-200	101-200	201-300	201-300	201-300	101-200	80	101-200	301-400	101-200	201-300	52	101-200	101-200	101-200	201-300	96.	271	48,00%	30,7	351-400
26. Ghent University	Belgium	na																			98.	250	42,80%	28,2	103

* Delft University of Technology seems to have data at only SDG7 and SDG9 - 1st at this

Source: Hand-collected from the Reuters' most innovative universities (2019) list and the Times Higher Education (THE) impact and world university ranking (2021)

Table 2. European Universities ranked among the first 100 innovative universities by Reuters' and among the first 200 in impact (SDG) by the Times Higher Education

Ranking of the 26 most innovative European Universities (2019 Reuters)	Name of the University	Country	Overall Ranking in SDG	Innovation ranking				World ranking 2021
				https://www.reuters.com/innovative-universities-2019	Patents filed 2012-2017	Success rate of filed patents	Commercial Impact score	
1.	KU Leuven	Belgium	101-200	7.	305	40%	43,3	45
5.	University of Montpellier	France	201-300	44.	187	70,60%	27,9	301-350
9.	Sorbonne University	France	201-300	56.	383	44,60%	31,7	87
11.	Delft University of Technology*	Netherlands	na	60.	147	73,50%	37,6	78
19.	University of Bordeaux	France	201-300	80.	205	54,60%	41,4	401-500
25.	University of Aix-Marseille	France	201-300	96.	271	48,00%	30,7	351-400

* Delft University of Technology seems to have data at only SDG7 and SDG9 - 1st at this

Table 3. The results of the correlation analysis 1.

		Correlations					
		SDG ranking (2021)	Innovation ranking (2019)	World ranking (2021)	Patents filed 2012-17	Success rate of filed patents	Commercial impact score
SDG ranking (2021)	Pearson Correlation	1	,807	,668	-,246	,543	-,674
	Sig. (2-tailed)		,099	,218	,691	,344	,212
	Sum of Squares and Cross-products	8000,000	4960,000	19200,000	-3480,000	1156,000	-830,000
	Covariance	2000,000	1240,000	4800,000	-870,000	289,000	-207,500
	N	5	5	5	5	5	5
Innovation ranking (2019)	Pearson Correlation	,807	1	,688	-,194	,155	-,346
	Sig. (2-tailed)	,099		,131	,713	,770	,502
	Sum of Squares and Cross-products	4960,000	4728,833	16685,500	-2588,667	330,683	-332,533
	Covariance	1240,000	945,767	3337,100	-517,733	66,137	-66,507
	N	5	6	6	6	6	6
World ranking (2021)	Pearson Correlation	,668	,688	1	-,339	,152	-,271
	Sig. (2-tailed)	,218	,131		,512	,774	,603
	Sum of Squares and Cross-products	19200,000	16685,500	124419,500	-23204,000	1667,750	-1338,100
	Covariance	4800,000	3337,100	24883,900	-4640,800	333,550	-267,620
	N	5	6	6	6	6	6
Patents filed 2012-17	Pearson Correlation	-,246	-,194	-,339	1	-,864*	-,066
	Sig. (2-tailed)	,691	,713	,512		,026	,901
	Sum of Squares and Cross-products	-3480,000	-2588,667	-23204,000	37757,333	-5225,067	-180,333
	Covariance	-870,000	-517,733	-4640,800	7551,467	-1045,013	-36,067
	N	5	6	6	6	6	6
success rate of filed patents	Pearson Correlation	,543	,155	,152	-,864*	1	-,290
	Sig. (2-tailed)	,344	,770	,774	,026		,578

	Sum of Squares and Cross-products	1156,000	330,683	1667,750	-5225,067	967,648	-125,863
	Covariance	289,000	66,137	333,550	-1045,013	193,530	-25,173
	N	5	6	6	6	6	6
Commercial impact score	Pearson Correlation	-,674	-,346	-,271	-,066	-,290	1
	Sig. (2-tailed)	,212	,502	,603	,901	,578	
	Sum of Squares and Cross-products	-830,000	-332,533	-1338,100	-180,333	-125,863	195,273
	Covariance	-207,500	-66,507	-267,620	-36,067	-25,173	39,055
	N	5	6	6	6	6	6

*. Correlation is significant at the 0.05 level (2-tailed).

Source: SPSS 22

Figure 4. Relation of SDG and innovation rankings at the 6 universities

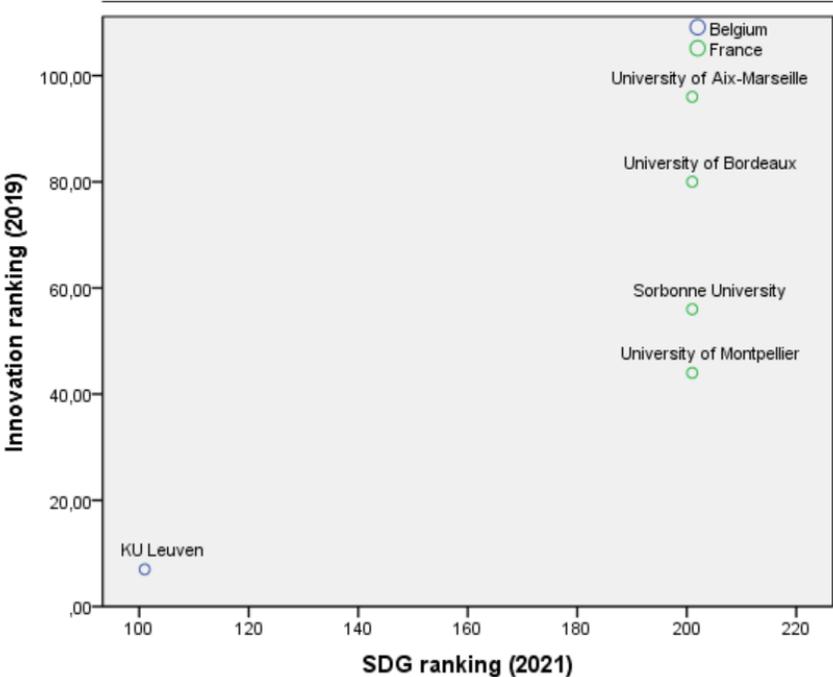


Chart Legend Information

Settings	Value
Color by	Country
Size by	---
Shape by	---
Label by	Name of the university
Fit Lines	---

Legend Settings for the charts that follow. Some settings do not apply to categorical charts.

Table 4. List of the most innovative, best at SDG European universities and the UK and US universities best at these indicators

	Name of the University	Country	SDG Ranking (the times higher)	Innovation ranking (reuter)	World ranking (2021)	Google name of the uni + innovation (3 July 2022)	Google name of the uni + sustainability (3 July 2022)	No of FTE students (2021)	Student Ratio of Females	No. of students per staff	Percentage of International students	Percentage of International webmap	Letöltés ideje 2022.07.07.	Innovat	Sustain	Note	Innovat	Sustain	Innovat	Sustain	Impact
1.	Aalborg University	Denmark	6.	na	201 - 250	1 520 000	1 250 000	16519	49/51	12,8	13%	https://www.aau.dk/	3	3	European Consortium	0	13	no	yes		
2.	University College Cork	Ireland	8.	na	301- 350	5 980 000	1 530 000	17397	58/42	20,3	20%	https://www.ucc.ie/en/	4	3	https://www.ucc.ie/en/	21	22	partly	yes		
3.	University of Bologna	Italy	20.	na	167	8 310 000	4 200 000	68370	57/43	24,3	12%	https://www.unibo.it/en/	1	0	https://www.unibo.it/en/	6	0	partly	no		
4.	University of Coimbra	Portugal	21.	na	601 - 800	1 340 000	594 000	21845	57/43	18,4	20%	https://www.ucp.pt/en/	1	0				no	no		
5.	KTH Royal Institute of Technology	Sweden	41.	na	201 - 250	2 020 000	403 000	13422	34/66	16,7	21%	https://www.kth.se/en/	2	1	https://www.kth.se/en/	31	1	yes	no		
6.	Politechnic University of Valencia	Spain	83.	na	801 - 1000	993 000	358 000	22562	42/58	10,8	16%	http://www.upv.es/en/	2	0	https://innovation.upv.es/	10	0	yes	no		
7.	Free University of Berlin	Germany	101 - 200	na	118	40 600 000	23 400 000	27018	61/39	43,2	23%	https://www.fu-berlin.de/	0	4				no	no		
8.	IMT Atlantique	France	101 - 200	na	351 - 400	268 000	67 800	1546	24/76	8,2	39%	https://www.imt-atlantique.com/	7	1	Research/Innovation	6	1	partly	no		
9.	Université Catholique de Louvain	Belgium	101 - 200	na	164	6 460 000	3 850 000	26424	54/46	39,1	20%	https://uclouvain.be/en/	1	0	https://uclouvain.be/en/	33	0	partly	no		
10.	Vrije Universiteit Amsterdam	Netherlands	101 - 200	na	116	8 400 000	10 600 000	25443	58/42	18	13%	https://vu.nl/en/	0	0	https://vu.nl/en/innovation/	0	3	partly	no		
11.	Lappeenranta-Lahti University of Technology	Finland	201 - 300	na	351 - 400	68 800	103 000	4333	31/69	29,6	15%	https://www.lut.fi/en/	0	1	separate pages for innovation services for	yes		no			
12.	University of Latvia	Latvia	201 - 300	na	601 - 800	11 000 000	10 900 000	12007	70/30	31,7	7%	https://www.lu.lv/en/	0	2	https://www.lu.lv/en/innovation/	na	na	yes	no		
13.	University of Pécs	Hungary	201 - 300	na	601 - 800	802 000	632 000	16798	57/43	11,7	24%	https://www.nyit.hu/en/	1	0				no	no		
14.	KU Leuven	Belgium	101 - 200	7.	45	15 300 000	1 290 000	45617	50/50	36,1	15%	https://www.kuleuven.be/	2	0	https://www.kuleuven.be/	2	0	partly	impact		
15.	University of Erlangen Nuremberg	Germany	na	14.	198	1 890 000	769 000	38052	49/51	57,3	12%	https://www.fau.eu/	2	1				no	no		
16.	EPFL - Swiss Federal Institute of Technology	Switzerland	na	17.	43	3 540 000	1 000 000	10942	29/71	12,2	60%	https://www.epfl.ch/en/	8	1	https://www.epfl.ch/	48	46	yes	yes		
17.	ETH Zurich	Switzerland	na	40.	14	29 000 000	23 000 000	19632	32/68	13,1	40%	https://ethz.ch/en.html	0	2	Title - Industry and Kin	na		partly	no		
18.	University of Montpellier	France	201 - 300	44.	301-350	5 540 000	2 250 000	39703	53/47	19,7	15%	https://www.umontpellier.fr/	3	0				no	no		
19.	Technical University of Munich	Germany	na	46.	41	13 400 000	5 430 000	32377	36/64	39,8	31%	https://www.tum.de/en/	6	3	https://www.tum.de/en/	10	0	yes	no		
20.	Technical University of Denmark	Denmark	na	48.	187	36 700 000	14 200 000	9412	31/69	6,7	25%	https://www.dtu.dk/english/	1	6	Innovation is a title, i	43	3	yes	no		
21.	University of Zurich	Switzerland	na	51.	73	21 200 000	8 210 000	22960	57/43	14,8	21%	https://www.uzh.ch/en/ht	0	0	https://www.innovation.uzh.ch/	13	0	yes	no		
22.	Sorbonne University	France	201-300	56.	87	15 700 000	876 000	43585	58/42	12,8	20%	https://www.sorbonne-universite.fr/	7	0	https://www.sorbonne-universite.fr/innovation/	6	0	partly	no		
23.	Ruprecht Karl University Heidelberg	Germany	na	59.	42	217 000	112 000	20020	54/46	14,5	18%	https://www.uni-heidelberg.de/en/	1	3	https://www.uni-heidelberg.de/en/innovation/	0	10	no	yes		
24.	Delft University of Technology	Netherlands	*	60.	78	8 850 000	6 110 000	19594	30/70	17,4	31%	https://www.tudelft.nl/en/	2	4	https://www.tudelft.nl/en/innovation/	18	2	yes	yes	impact	
25.	University of Paris Sud	France	na	64.	na	20 500 000	5 990 000	na	na	na	na	na									
26.	University of Paris Descartes	France	na	66.	na	15 900 000	368 000	na	na	na	na	na									
27.	Johannes Gutenberg University of Mainz	Germany	na	70.	301-350	9 670 000	627 000	31773	59/41	25,7	11%	https://www.uni-mainz.de/	0	1	https://tu-dresden.de/	1	3	partly	no		
28.	Leiden University	Netherlands	na	71.	70	13 400 000	7 190 000	30178	59/41	19	18%	https://www.universiteitleiden.nl/en/	0	0	https://www.universiteitleiden.nl/en/innovation/	16	1	partly	partly	impact	
29.	University of Munich	Germany	na	75.	na	15 800 000	8 100 000	34249	61/39	33,6	17%	https://www.lmu.de/en/	1	0	https://www.lmu.de/en/innovation/	1	0	partly	partly		
30.	University of Claude Bernard	France	na	77.	501-600	3 520 000	1 530 000	27490	53/47	13	13%	https://www.univ-lyon1.fr/	1	0				no	no		
31.	Dresden University of Technology	Germany	na	79.	152	5 390 000	950 000	31103	43/57	32,9	15%	https://tu-dresden.de/?se	1	1	https://tu-dresden.de/	1	0	partly	no		
32.	University of Bordeaux	France	201-300	80.	401-500	6 530 000	4 260 000	54812	59/41	22,4	13%	https://www.u-bordeaux.fr/	0	0				no	no		
33.	University of Freiburg	Germany	na	82.	83	9 650 000	2 600 000	14878	54/46	32,5	21%	https://uni-freiburg.de/en/	0	1				no	no		
34.	RWTH Aachen University	Germany	na	89.	107	1 150 000	658 000	45256	32/68	58,4	23%	https://www.rwth-aachen.de/	7	0	https://www.rwth-aachen.de/innovation/	6	0	yes	no	only in Ge	
35.	Grenoble Alpes University	France	na	91.	351-400	4 730 000	283 000	40486	53/47	17,1	14%	https://www.univ-grenoble.fr/	4	0	https://www.univ-grenoble.fr/innovation/	24	1	yes	no		
36.	Utrecht University	Netherlands	na	93.	75	12 400 000	7 320 000	32022	58/42	14	10%	https://www.uu.nl/en/	0	3	https://www.uu.nl/en/innovation/	2	22	no	yes		
37.	Technical University of Berlin	Germany	na	94.	140	45 600 000	21 600 000	22695	34/66	60,8	26%	https://www.tu-berlin.de/en/	0	0				no	no		
38.	University of Aix-Marseille	France	201 - 300	96.	351-400	837 000	604 000	68841	59/41	16,7	13%	https://www.univ-amu.fr/	0	0	https://www.univ-amu.fr/innovation/	20	2	partly	yes		
39.	Ghent University	Belgium	na	98.	103	10 500 000	4 120 000	37587	56/44	36,1	11%	https://www.ugent.be/en/	1	1	https://www.ugent.be/en/innovation/	1	0	partly	partly		
40.	University of Oxford	UK	na	32.	1	173 000 000	85 300 000	20774	46/54	11,1	41%	https://www.ox.ac.uk/	2	0	https://innovation.ox.ac.uk/	10	22	yes	yes		
41.	Stanford University	US	na	1.	2	77 300 000	22 900 000	16223	44/56	7,4	23%	https://www.stanford.edu/	3	0	"About StanfordA pla	4	16	yes	yes		
42.	Imperial College London	UK	na	10.	11	32 600 000	25 400 000	17176	39/61	11,6	58%	https://www.imperial.ac.uk/	2	0	https://www.imperial.ac.uk/innovation/	4	1	partly	no		
43.	University of Manchester	UK	1.	49.	51	28 400 000	16 800 000	36557	53/47	14,4	41%	https://www.manchester.ac.uk/	4	0	https://www.manchester.ac.uk/innovation/	8	4	no	partly	impact	
44.	Arizona State University (Temple)	US	9.	na	184	25 100 000	16 900 000	45827	43/57	19,7	20%	https://www.asu.edu/	3	0	https://www.asu.edu/innovation/	6	1	partly	no		

benchmarks (UK and US bests)
 innovation best Europeans
 SDG best Europeans
 excluded because of lack of data

Source: own collection based on different databases and searches

Table 5. The results of the correlation analysis 2.

		Correlations							
		SDG ranking	Innovation ranking	World ranking	NUmber of FTE students	Students/staff	Percentage of international students	Google search "innovat"	Google search "sustain"
SDG ranking	Pearson Correlation	1	-,231	,363*	,063	-,098	-,122	-,187	-,132
	Sig. (2-tailed)		,141	,018	,690	,538	,440	,235	,405
	N	42	42	42	42	42	42	42	42
Innovation ranking	Pearson Correlation	-,231	1	-,234	,372*	,199	-,175	-,046	-,078
	Sig. (2-tailed)	,141		,135	,015	,206	,269	,773	,624
	N	42	42	42	42	42	42	42	42
World ranking	Pearson Correlation	,363*	-,234	1	-,106	-,140	-,336*	-,339*	-,318*
	Sig. (2-tailed)	,018	,135		,504	,376	,030	,028	,040
	N	42	42	42	42	42	42	42	42
NUmber of FTE students	Pearson Correlation	,063	,372*	-,106	1	,249	-,379*	-,125	-,137
	Sig. (2-tailed)	,690	,015	,504		,112	,013	,429	,388
	N	42	42	42	42	42	42	42	42
Students/staff	Pearson Correlation	-,098	,199	-,140	,249	1	-,255	-,124	-,116
	Sig. (2-tailed)	,538	,206	,376	,112		,104	,436	,465
	N	42	42	42	42	42	42	42	42
Percentage of international students	Pearson Correlation	-,122	-,175	-,336*	-,379*	-,255	1	,353*	,418**
	Sig. (2-tailed)	,440	,269	,030	,013	,104		,022	,006
	N	42	42	42	42	42	42	42	42
Google search "innovat"	Pearson Correlation	-,187	-,046	-,339*	-,125	-,124	,353*	1	,961**
	Sig. (2-tailed)	,235	,773	,028	,429	,436	,022		,000
	N	42	42	42	42	42	42	42	42
Google search "sustain"	Pearson Correlation	-,132	-,078	-,318*	-,137	-,116	,418**	,961**	1
	Sig. (2-tailed)	,405	,624	,040	,388	,465	,006	,000	
	N	42	42	42	42	42	42	42	42

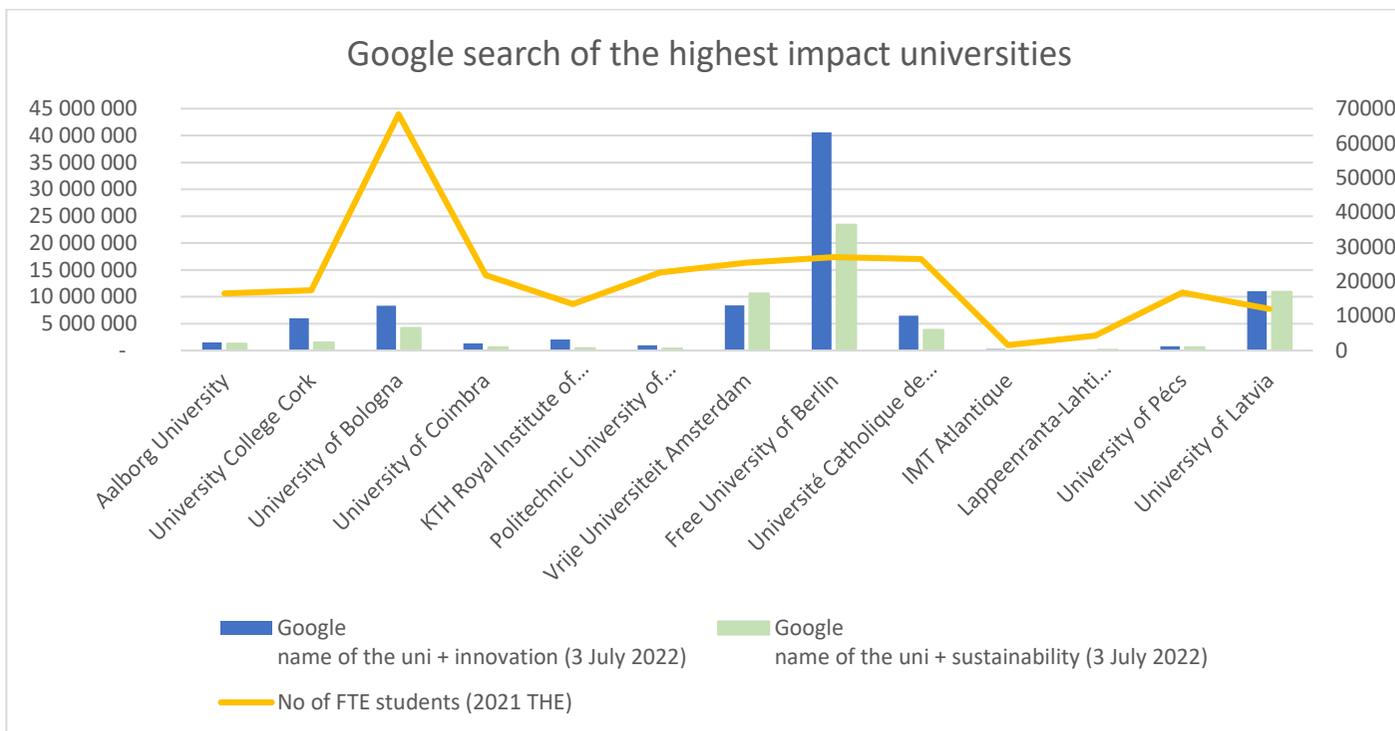
*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

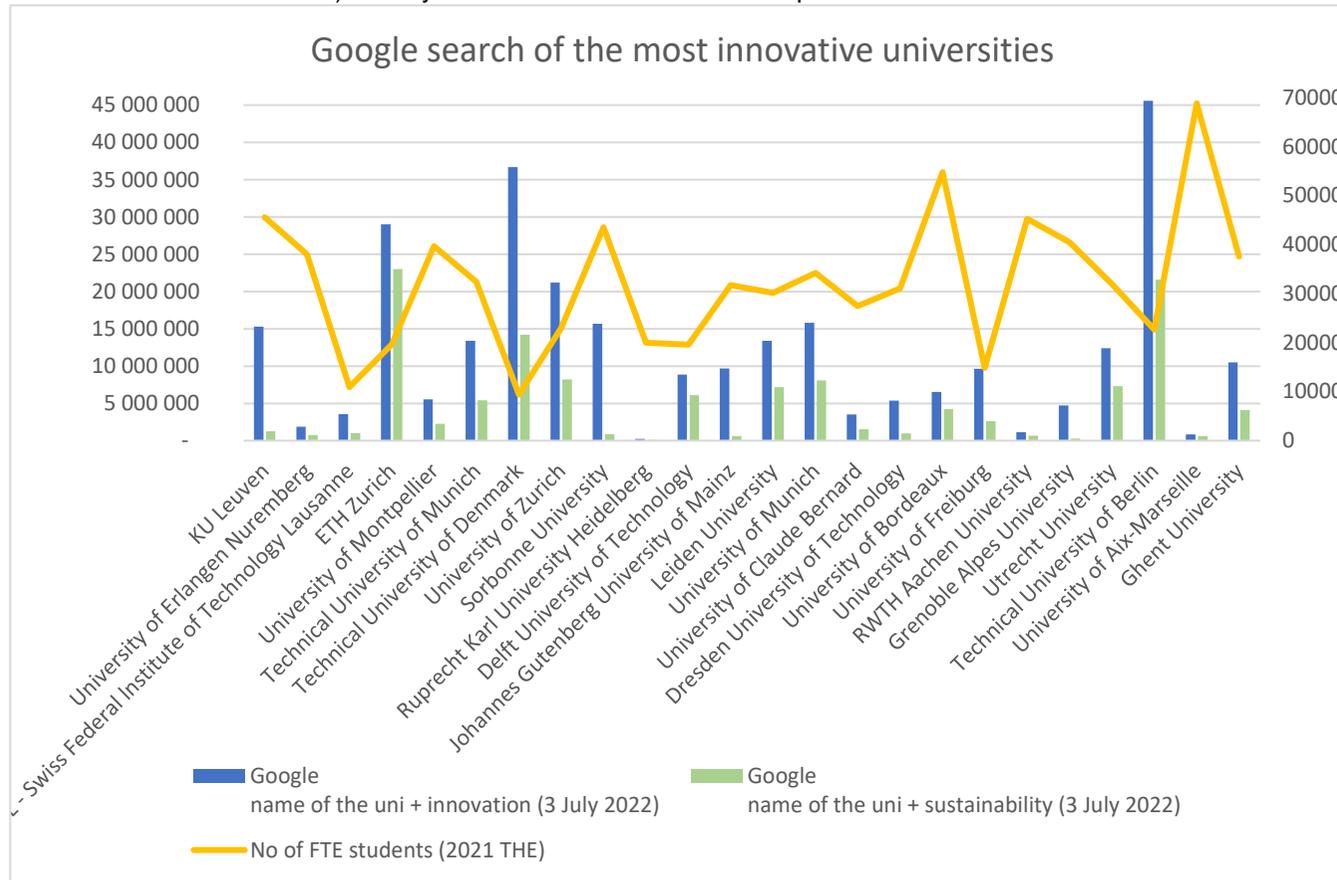
Source: SPSS 22

Figure 5. (a, b, c): Google search of the universities and the size of the universities (Number of FTE students)

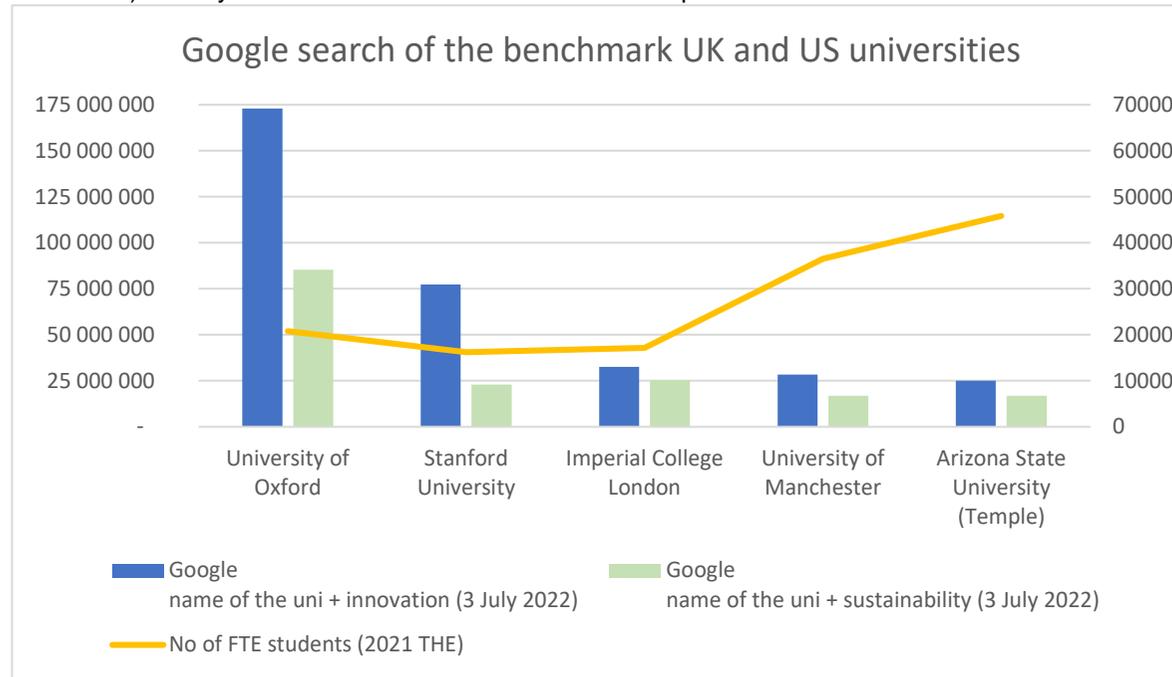
a) Analysis of the European universities highest ranked in impact/SDG



b) Analysis of the most innovative European universities



c) Analysis of the most innovative and most impactful UK and US universities



Source: own work based on the THE data

Our sample is in line with the assumptions of the correlation analysis as the observations are independent and the two variables most probably follow a bivariate normal distribution at the universities (which is the population in this research). **Hiba! A hivatkozási forrás nem található.** shows clearly that the correlation between the different indicators differs.

The research was done by SPSS22 and the used indicators besides the impact on SDG and innovation were the parts of the innovation index - the patents filed in the 5 years between 2012-17, the success rate of the filed patents, and the commercial impact score - and the table also includes the world ranking of the universities by the times higher education list.

We can find weak and stronger linear descending and ascending values, even between indicators that should correlate (like the sub-indicators of the innovation ranking and the innovation ranking itself). For example, the correlation between the SDG and the innovation index is .807, but the number of filed patents and the SDG ranking's correlation is -.246. It is strange as the number of filed patents is part of the innovation index. As the correlations are sometimes positive, other times negative and the strength of the correlation differs, too, no real correlation can be identified. The SPSS did not flag any significant correlations at the .05 level.

Definitely, the low number of the variables has a great role in that, but the differences of the universities working in different parts of the world would also distort the results if we would have tried to use the available data of all the universities.

To come over the problem of the low number of data, then in a new analysis all innovative and good impact universities together with the UK and US universities which are the highest-ranked in these were done. It meant 44 universities altogether, but for two - University of Paris Sud and University of Paris Descartes - data were not available, so 42 universities were ranked. As kind of a simple content analysis, a Google search was implemented ("name of the university" + "innovate*" and then "name of the university" + "sustain*"), the data about the number of FTE students, female:male proportions of the students, number of students / staff and the percentage of international students were included. Moreover the terms "innovate*" and "sustain*" were looked through the main landing pages of the universities and it was also analysed if they have a separate page for innovation and/or sustainability. If they had any – three categories were formed yes/no/partly (where the latter meant that most if the times innovation was connected with research, while sustainability sometimes was translated as impact) – the frequency of the above-mentioned terms was analysed there, too.

In Table it is visible that the only strongly significant correlation (0.961) is between the Google searches for the name of the universities and the terms "innovate*" or "sustain*". A much weaker correlation is justified between the terms and the percentage of the international students (0.418 for sustainability and 0.353 for innovation), with the world ranking the correlation is negative (-0.339 for innovation and -0.318 for sustainability), while world ranking and SDG ranking has a weak positive correlation (0.363). The correlation of the number of FTE students and the innovation ranking is also positive, but weak (0.372).

The regression analysis (4. Figure) was implemented in SPSS 22 to predict the value of sustainability based on the value of innovativeness.

It is visible that 4 of the 5 universities are on the same vertical line, which is caused by the fact that the impact analysis is grouping the universities into groups of 100, so only the first 100 has a real rank. This method of ranking also has an effect on our results.

Based on the Google searches (name of the university + „innovat*” and „sustain*”) it is evident, that there is no correlation among the innovativeness, impact and size (number of FTE students) of the universities. At

Figure 5. (a, b, c): Google search of the universities and the size of the universities (Number of FTE students), it is visible that at figure a) the universities are in the sequence of their impact on SDG and the Free University of Berlin, which is kind of in the middle of this list has the highest numbers in Google searches. Its size is above the modus (21,052.62) of the most impactful universities, but below the average size of all the analysed universities (28,178.69).

The situation is a bit more complex at the most innovative universities, where a German (Technical University of Berlin), a Danish (Technical University of Denmark) and a Swiss (ETH Zurich) are leading the list of the Google searches, which would make one to believe that technical universities have a comparative advantage.

Anyway it is also visible on table c) that the benchmark UK and US universities has much more hits. For innovation it is ten-times of the most impactful universities' average (6,750,908) and 5,56-times of the average of the most innovative universities (12,104.750). Of course, the high number of the University of Oxford (173,000,000) has a role in that, but even the lowest number is twice of the average of the most innovative universities.

At sustainability the averages of the most impactful universities (4,452,908) and the most innovative universities (5,128,708) are closer to each other, although the most innovative universities seems to have more hits for sustainability. The benchmark universities average (33,460,000) is still 6+-times of any of the mentioned values. It was also interesting that these results are not based on the websites of the benchmark universities as they had very few hits on their main webpages for innovation, none for sustainability and they do not have dedicated websites for these topics (at some cases research was the closest topic), while some universities has more dedicated landing pages for these, but their numbers are much lower.

It is also interesting that from the members of the European Consortium of Innovative Universities (ECIU) only one (Aalborg University) was part of this list, with the highest rank in SDG in Europe (6th place worldwide).

Conclusion

The research could not justify the correlation of innovativeness and sustainability in the small sample of the European universities that are both on the list of the world's most innovative universities and are among the first 300 on the impact on SDGs (total). The merged list contained 5 universities and we had special attention on the Delft University of Technology, because of its first place in SDG9 (even if it is not on the overall list as provides data on only 2 SDGs, instead of at least 4 containing SDG17).

As the literature suggests that there is a relation between the two, the result was surprising, and the mapping of the possible reasons started.

As even a simple google search (name of the university + SDG) gives different results at some interesting universities, we can be sure, that the publicly available lists do not fully represent the reality. The efficiency of the self-reporting is also discussed by a new, but very important research (De la Poza et al., 2021), which stated, that universities do not provide data in all the categories, in spite of the fact that the biggest part (39%) of the sample was from European universities, which represents their commitment to sustainability (Asia 32%, North-America 16%, South America 6%, Oceania 3%).

It is caused by many factors some of which can be unequivocal, like the methodology of the lists. There Goodhart's law is a must to mention, according to which "When a measure becomes a target, it ceases to be a good measure".

For example, the world university ranking list contains only universities that publish at least 1,000 papers over a five-year period (at least 150/year), teach undergraduates, and work across a range of subjects (less than 80% of research in one single subject) (THE world university rankings 2021: Methodology.).

At the impact ranking any university that provides data on SDG 17 and at least three other SDGs is included in the overall ranking – this is why the Delft University of Technology is not part of the list, in spite of its 1st place in SDG9 and good position in SDG7 (Impact rankings 2021: Methodology.).

The final score is calculated by the score of SDG17 and the three bests of the other 16 SDGs on the four broad areas of research – for which the data is partly supplied by Elsevier, and partly by the universities. Self-reporting can also be a barrier to retrieving the real data as it seems not important to some universities to be part of the lists, while others use nice rankings as marketing (eg. the University of Manchester which refers to itself as the world's number 1 in impact rankings, which is detailed on their website and on the THE website, as a banner).

But we have to add, that indicators are not perfect. Some indicators based on comparable data are available, but even if innovation indicators are a useful supplement, there are important aspects of the third mission that are

covered by informal and indirect knowledge transfer. As a consequence, using only the direct HEI-industry comparison instruments might miss the target (Urdari et al., 2017).

As (Giesenbauer & Müller-Christ, 2020) stated, Higher-Education Institutions (HEIs) were considered “pivotal agents” of sustainability since the first presence of the term in 1987. One of the causes identified as the reason for the failed efforts to promote it to HEIs is the need for systematic transformation.

Mazon and his fellows mention that despite of the literature – which prefers the participatory approach - in the practice of the sustainability promotion models the top-down manner is the general, which does not support the commitment of the students. (Mazon, Gisele, Ribeiro, de Lima, Carlos Rogerio Montenegro, Castro, & de Andrade, José Baltazar Salgueirinho Osório, 2020).

But when we analysed a broader list of the universities, including the most innovative and the most impactful ones, and as a benchmark the UK and US universities, which are the best in innovation and sustainability were also included the only strong correlation was found at the Google searches for the “name of the university” + “innovate*” and the “name of the university” + “sustain*”. No correlation was found to factors like the size of the university (number of FTE students) or its world ranking.

Implications for universities

Rankings seem not equally important for the universities, although those have an effect on society, media, the decisions of the prospective students, and their parents. These are economic decisions - where we have to raise the attention to the danger of Goodhart’s law, again - and can contribute to regional development (Urdari et al., 2017).

That is why it can be advantageous to the universities to provide information on their contribution to the SDGs and innovativeness besides the education and research perspectives.

It would be more and more important to plan, implement and control their effects on the SDGs as they are key players in the knowledge economy. As the figure from a UN edition at the beginning of this paper showed, they can even profit from that. As for today's and for the next generations sustainability is a must, it can have an effect on their admission rates and other work, like the publications.

That is why it is important to keep up and work on papers important for humanity.

Implications for policy

Governments have a crucial role not only for the public universities. The calls and grants available can change the focus of the research, making sustainability a more important part of life in higher education. Just an example of the transformation from University 3.0 to a sustainable entrepreneurial university - if the government or the EU supports sustainable innovations at the SMEs, it can happen that more cooperation will concentrate on this area. The support of innovative sustainability and/or sustainable innovations can put even more light on the importance of this area. Mazon et al. also stated that “sustainability indicators are not only traditional performance metrics but are also important to support the development of universities” (Mazon, G., Berchin, Soares, & de Andrade Guerra, 2019).

Implications for theory

more comprehensive indicators to measure the topics and their correlations

As some researchers have already failed in founding the correlations among the lists, there are many critics relating to the methods of the lists. Anyway, it was kind of shocking during the research, how few universities from Europe are entitled to be part of the analyzed lists. It clearly shows the difference between the systems. One suggestion can be to have a solely European list, as it is clear that Europe is still the second biggest 'market' in higher education (28% after the 40% of the US).

The Higher Education Market size was valued at USD 13.7 Billion in 2020 and is projected to reach USD 64.2 Billion by 2028, and it is fuelled by the increasing number of students enrollments globally.¹

Research limitations

The research is based on publicly available lists and the data for the universities of Europe was hand-collected and checked. The first limitation is based on the method of secondary research (availability and content of the datasets) and the second is on narrowing the data to only the European universities.

The above-mentioned method has driven to the only 5 universities that were represented on both lists. The number of available data is limited for research. As we collected other data to check the correlation between innovation and sustainability by a simple Google search (name of the university + “sustain*” and name of the university + “innovate*”), which showed the strong correlation on the sample of 42 universities.

Moreover, the reliability and correlation of the indicators should also be checked.

¹ <https://www.verifiedmarketresearch.com/product/global-higher-education-market-size-and-forecast-to-2025/>

Future research possibilities

Future research can focus on other methods to find the connection between innovativeness and impact on SDGs at universities. The content analysis of the webpages of the universities can support this aim or the analysis of the EU projects of the universities, too. It was visible in the correlation analysis (Table), that there is a strong positive correlation between the Google searches of the names of the universities and the terms “innovate*” and “sustain*”, although there was no correlation between the rankings.

The reliability of the indicators is always questioned because of Goodhart’s law, methods (like self-reporting, difficulty of data gathering).

The use of other indicators to measure the innovativeness (Benneworth & Zeeman, 2016) or even the impact on sustainability is a way, too.

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The key drivers of sustainable practices in SMEs

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Abstract

According to the Globalization Council (2009), SMEs have more potential to meet important environmental and social targets than MNCs. However, it is quite challenging even for SMEs to synchronize sustainable development with the financial outcomes of a business and still offer economic prosperity. Therefore, the purpose of this study is to do a comprehensive investigation of the external and internal determinants which have an influence on the SMEs' incentive to contribute to society, both socially and environmentally. I used the systematic literature review technique to list the external and internal drivers of the sustainability practices in SMEs which were identified globally by various researchers. For policymakers and also for SMEs owners and managers, this paper can have practical implication, They should keep in mind that if SMEs want to get more benefits from their sustainability efforts, they should consider sustainability as a long-term strategy, in other words, if SMEs adopt environmental practices mainly due to strategic intent, not only cost saving intent, and focus on long-run financial and market position payoffs, they can be still beneficial and even increase their profits.

Key words: Sustainable practices, SME, drivers

Introduction

The increasing pressures to contribute to society, both socially and environmentally from ecology, regulations, customers, and social groups has slowly tend businesses to consider sustainability. There are lots of evidence that show the businesses play a key role on the road towards environmental sustainability. However, the ability to make a link between sustainable development and maintaining financial profitability has turned into a focal point for businesses.

Reviewing the literature shows that there are only a small number of studies that focused on the sustainability issue in small and medium-sized enterprises, while most of them have primarily investigated sustainability practices with a focus on large enterprises. However, the evidence has proved the importance of the role of SMEs in different aspects such as employment, resource consumption, and pollution. The importance of SMEs can be evaluated in two aspects, in terms of its impact on the global and national economy and on sustainability development.

SMEs are one of the biggest employers and taxpayers in each economy and have crucial contribute to the national income through providing jobs and products (both good and services). The collective contribution of SMEs to economic growth worldwide is very high. SMEs account for 90 percent of companies and more than half of all employment globally ((the International Finance Corporation), 60% of the EU's GDP (OECD), 98% of all businesses in New Zealand (Lawrence et al., 2006), 99.8 % of all Turkish businesses (Agan et al., 2013), 99% of the Chines businesses, 60% of its exports, 40% of its GDP and 75% of its job opportunities (Lee & Klassen, 2008).

Regarding the importance of SMEs in terms of sustainable development, SMEs have a considerable impact on the ecological environment. SMEs are accountable for: approximately 60-70 % of total pollution (Hoogendoorn et al., 2015), half of the waste and pollution in EU countries, around 80% of pollution, and almost 60% of commercial waste in the UK(Halila, 2007; Revell et al., 2010) and 64% of air pollution is related to SMEs, especially within manufacturing sectors (Behjati, 2017).

SMEs have faced some problems in implementing sustainable practices. First of all, Most SMEs don't have enough information about making a link between the environmental management system, and its benefits and it is quite challenging for SMEs to synchronize sustainable development with the financial outcomes of a business.

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SMEs are the backbone of each country and play an important role in different aspects such as employment, resource consumption, and pollution. Being proactive in Sustainability issues is not only important for the large companies but for SMEs as well. Therefore, it is surprising that the sustainability of SMEs has received little attention from researchers compared to large companies.

Therefore, there is a need for more research focusing on the factors that motivated SMEs to have sustainable practices and still offer economic prosperity. This paper aims to do a comprehensive investigation of the external and internal determinants which have an influence on the SMEs' incentive to contribute to society, both socially and environmentally.

Following Yadav et al., (2018), this study employs a Systematic Literature Review (SLR) technique to list the external and internal drivers of the sustainability practices in SMEs which were identified globally by various researchers. This technique has helped to build a reliable knowledge base and according to Tranfield et al., (2003) this technique is about "synthesizing research in a reproducible, transparent, and systematic manner".

The study is structured as follows: the second section summarizes the theoretical background of the sustainability concept. The third section presents the methodology used in this study (Systematic Literature Review technique) both theoretically and practically. The fourth section contains description of results arising from thematic analysis (both external and internal drivers). The last section is about conclusions and discussion.

Theoretical background

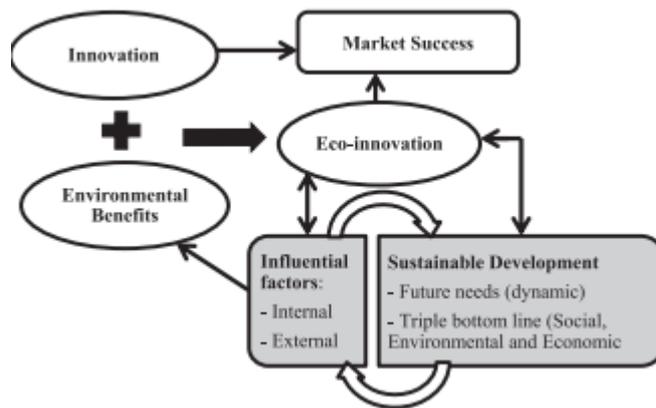
The scholars have related the concept of sustainability to the triple bottom line (TBL) in which the enterprises must evaluate their performance in a triple perspective consists social, environmental, and financial outcomes (Tsvetkova et al., 2020). Bossle et al., (2016) argued that the basis of Sustainable development is in the triple bottom line meaning that this concept is needed to be an integration of environmental, economic and social performance, that is quite challenging for companies.

Some literature called this concept corporate sustainability. According to Dyllick and Hockerts (2002), corporate sustainability at the business level is meeting the needs of all direct and indirect stakeholders of a company including shareholders, employees, clients, pressure groups, communities, etc plus considering the future stakeholders' needs as well.

Based on this definition, corporate sustainability has three dimensions. The first dimension is the economic dimension, meaning having enough cash flow to meet the liquidity requirement and satisfy the shareholders. The second dimension is the environmental sustainability dimension meaning that the company must have a positive impact on the ecosystem by trying to protect natural resources and the environmental system. The third dimension is the Social dimension meaning that the company must have a positive social impact for example by adding value to the human capital (Günerergin et al., 2012).

Bossle et al., (2016) investigated the drivers of the adoption of the eco-innovation strategy, and they found that companies need to be innovative to include both the technological opportunities and market dynamics and all stakeholders' demands in the adoption of an eco-innovation strategy. Therefore, recognizing the key drivers to motivate companies to adopt an eco-innovation strategy is necessary both in the literature and then empirically. They considered eco-innovation as an output as well as companies' goal which can be triggered by the government and demanded by society. Figure (1) shows the Eco-innovation dynamics- innovation, sustainable development, and influential factors.

Figure1: Adoption of Eco-innovation and its influential factors by Bossle et al., (2016)



Source: Bossle et al., (2016)

Methodology

Following Yadav et al., (2018), this study employs a Systematic Literature Review (SLR) technique to list the external and internal drivers of the sustainability practices in SMEs which were identified globally by various researchers. This technique has helped to build a reliable knowledge base and according to Tranfield et al., (2003) this technique is about “synthesizing research in a reproducible, transparent, and systematic manner”. Technically, this approach has three steps which starts by recognizing the prerequisite of research and question, then exploring the appropriate literature and its analysis and then reporting formulated discoveries (Yadav et al., 2018). According to Tranfield et al., (2003), bibliographical, quantitative analysis, and a more qualitative thematic analysis are the elements of systematic literature review.

In order to have a comprehensive and precious analysis of reviewing literature, SLR technique has been implemented in two main process, Search process and Descriptive analysis. Search process includes

Table 1. The steps of conducting the Systematic Literature Review (SLR) technique

The main stages	Identifying Sub- steps	The results of each step		
Search process	Identification of keywords by analyzing previous research	SMEs	Sustainability practices	Driver
		Small firms, Small businesses, Small companies, Medium-size firms, Medium-size companies	Green practices, Environmental practices, Sustainability actions, sustainability development	Determinant, Pressures, Motivators, Influencers, factors

	Searching in research databases to development a set of exclusion and inclusion criteria (the targeted journals, the year of publication, countries covered)	papers published between 2002-2020 in Q1, Q2, Q3 and Q4 journals are the targeted papers.
Descriptive analysis	Thematic Analysis	Using the MindView8 software to theme the drivers of sustainability practices in SMEs.

Source: authors' compilation

Table (1) describes the process of doing this technique for this study step by step. The first step is to identify the keywords to search among the literature to make sure that it covers all kinds of available literature. This study has three keywords- SMEs, Sustainability practices, and Drivers- I developed a group of keywords based on some of the interpretations of these three words, which are shown in table 1. Finally, the total number of keywords used to search is 14 keywords each piece of literature at least has one of them.

For the second step, a set of exclusion and inclusion criteria was developed based on analysing the title and abstracts of the literature. This study considered two inclusion criteria, selecting those papers published between 2005-2020 and in Q1, Q2, Q3, and Q4- ranked journals.

Thematic analysis

The last step of the Systematic Literature Review (SLR) technique is the thematic analysis. Raising the trustworthiness of data requires qualitative researchers to conduct data analysis rigorously and systematically through thematic analysis, otherwise proving the quality of their work will be difficult. In this context, Figure (2) shows the process of conducting the thematic analysis technique proposed by Nowell et al., (2017) (Tsvetkova et al., 2020).

Figure 2. Thematic analysis technique's process by Nowell et al., (2017)



Source: Tsvetkova et al., (2020)

To do that, this study used the MindView8 software to theme the drivers of sustainability practices in SMEs. Through thematic analysis, two major building blocks emerged to identify the key drivers of sustainable practices in an SME context, External and Internal Drivers. Considering that the external drivers influence the internal drivers, and both have an impact on the SMEs' incentive to adopt the sustainability practices, this study first investigates the external drivers, then moves to the internal drivers in detail. Also, Figure (3) shows the emergent themes of these sustainability drivers.

External Drivers

The fact is without the external pressure, most SMEs have no incentive to adopt sustainability practices (Yadav et al., 2018). In this section, the most important external drivers are described.

a. Government

The literature showed that the most important external driver is Government. Government has the power to influence the behavior of SMEs through various factors such as regulation, legislation, economic and infrastructural support, and knowledge dissemination.

Zhang et al. (2009) believed that government is able to push the SMEs to improve their environmental performance through the Regulation mechanism. Legislation is the primary tool for motivating sustainable practice in SMEs (Cambra-Fierro and Ruiz-Benítez, 2011). Furthermore, according to Sáez-Martínez et al., (2016), SMEs at least because of the fear of the high fines and penalties in case of non-compliance with regulations have to adopt sustainable practices.

Moreover, the financial and economic support of the government facilitates easy adoption and behavioral change in SMEs towards sustainable practices. As Gandhi et al. (2018) said, the economic support of the government for example through providing loans, grants, tax concessions, and other economic benefits has a significant impact on changing the behavior of SMEs toward having more green performance (Yadav et al., 2018).

b. Costumers

The literature proved that the costumers have the power to impact the behavior of SMEs and force them to adopt sustainability practices through green demand, compliance-driven demand, and the dynamics of buyer's organizations (Yadav et al., 2018). In fact, there is a positive relationship between the customers' proactive demand for green products, processes, and services and the development of environmental practices in SMEs. Moreover, according to Lee & Klassen, (2008), SME suppliers can be motivated to focus on efficient energy and resource management to reduce their footprints if the buyers support them. Also, Tsvetkova et al, (2020) stated that the behavior of SMEs to engage in sustainability practices might be dependent on the customer segments.

c. Suppliers

The Internationally operating SMEs are pressured more by the greening supply chain than the domestic ones because they have to meet the green procurement policies and environmental criteria before internationalizing their operations or establishing working relations with large internationalized corporations. Even for domestically operating SMEs who are under the umbrella of the global supply chains of large corporations, adopting sustainability practices in their operations has been argued to be important. Therefore Ghadge et al. (2017) argued that suppliers play a key role in motivating the SMEs to green the supply chain networks in the Greek dairy industry.

d. Network and Alliances

The evidence shows that SMEs because of their restrained resources are willing to take part in local business and environmental agencies' networks with the aim of collectively solve ecological and societal problems. The dissemination of knowledge on environmental practices and cost-benefit advantages have positive impact on SMEs (Gadenne,2009).

e. Community Surrounding

In some countries, the community and public demand are one of the most important drivers which force SMEs to take up environmental sustainability in their practices, for example in Australia ((Williams & O" Donovan, 2015), in the UK (Jansson et al. (2017). According to Wattanapinyo & Mol, (2013) in Thailand, the existence of Civil society agencies and institutions helped SMEs to improve environmental performance. Several environmental groups in Sweden are forcing the governments and companies to focus more on sustainability practices (Tsvetkova et al, 2020).

f. Competitors

Some studies (e.g. Lee and Klassen, 2008 and Testa et al., 2016) proved that the suppliers' attitude can be influenced by seeing that their competitors' behavior is changing toward introducing the new products in worldwide markets with the greater recyclability and environmental safety and with using recyclable materials in their products and with more green producing process. So, competitors can be considered as one of the important drivers for SMEs to adopt sustainability practices.

g. Tangibility aspect of the business sector

Another external driver out of various stakeholders drivers is the tangibility of the sector in which the SMEs operate which has a great effect on the adoption of environmental practices of the SMEs, such that greater the tangibility of the sector means a higher probability of introducing the environmental practices in their system by SMEs (Uhlaner et al. 2012). In line with Uhlaner et al. (2012), Hoogendoorn (2015) concluded that SMEs in high tangibility sectors focused more on sustainability practices and green products and services.

Internal Drivers

The second major building block is the internal drivers. These drivers are about the factors inside SMEs that might have effect on their incentives toward adoption of sustainability practices include employees, organisation culture, brand image and reputation, competitive advantage and strategic intent and environment management capability.

a. Employees

The importance of the demand from employees as one of the main internal factors in promoting SMEs to adopt environmental practices has been found in a study conducted by Zhang (2009). In another study by Ghadge et al., (2017), they found that in SMEs operating in the Greek food supply chain, investors can impact SMEs' decisions about environmental performance. by raising environmental consciousness.

b. Organizational Culture

The driver of Organization culture depends on four sub drivers including personal values and ethics of owners and managers, moral and social responsibility, management support, and knowledge management. Corporate environmental responsibility in SMEs is driven by the habit and lifestyles of SMEs' owners (Font 2016) and the personal commitment of SMEs' managers to pro-environmental attitudes (Koe et al., 2015).

According to Wahga et al., (2017), SMEs' moral and social responsibility towards their stakeholders and the natural environment motivated them to adopt sustainability activities. There are some studies indicated that the top managers' commitments toward social responsibility and ethical concerns have a significant effect on the SMEs to take up environmental practices (Gandhi (2018), Johnson, 2015; Lee, 2009; Thanki & Thakkar, 2018).

Tsvetkova et al, (2020) stated that the organizational culture is a key driver for the SMEs' sustainability actions because the owner-manager's personality and characteristics have a higher impact on the decision-making process in smaller enterprises than economic conditions.

c. Brand Image and Reputation

SMEs are trying to promote their corporate image as an ecologically responsible firm in the market through Social capital and environmental activities to demonstrate their environmental stewardship and improve their green public image (Battisti & Perry, 2011; Cambra-Fierro & Ruiz- Benítez, 2011; Gandhi et al., 2018; Lee, 2009; Revell et al., 2010; Roy et al., 2013) for economic gains, legitimising their existence, attracting customers, increasing their sales, and satisfying their external stakeholders (Yadav et a., 2018).

d. Competitive Advantages and Strategic Intent

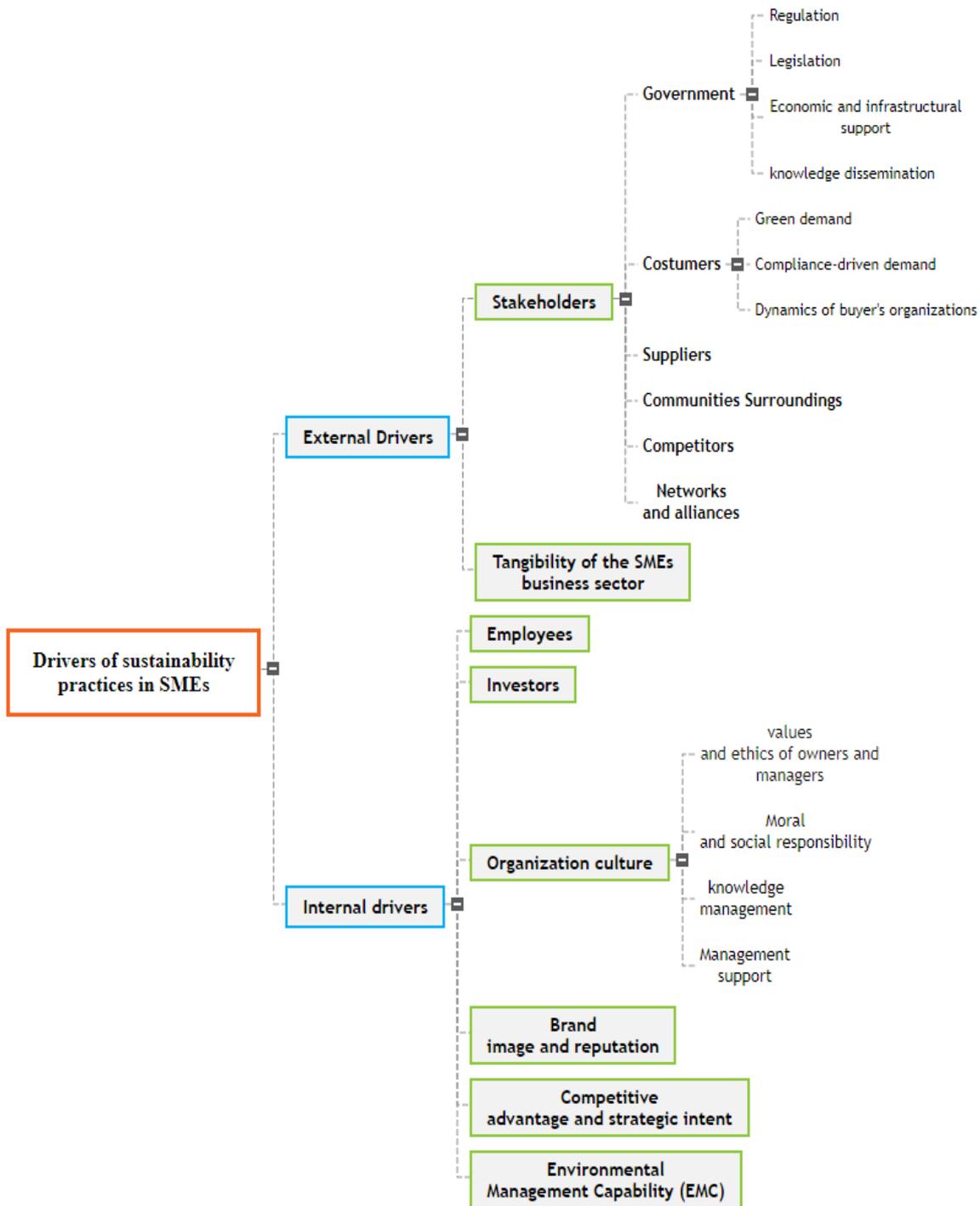
Adopting the environmental sustainability practices improves competitive advantages for SMEs through getting benefits from cost reduction, waste reduction, recycling, differentiation, etc. So, it can be considered a key driver of motivating SMEs to change their operation toward green manufacturing practices. As Gadenne et al., 2009 state

SMEs' owner-managers do this transformation with cost-saving intentions. However, we know that transforming into a greener organization requires more investment in technology developments, employee training, and a reconstruction of the organizational structure and it might be quite challenging for SMEs. However, Sáez-Martínez et al., (2016) said that it can be still beneficial for SMEs if they do environmental practices mainly due to strategic intent. Moreover, Jansson et al., (2017) argued that long-run financial and market position payoffs are strategic motivators for enhancing the environmental and operations performances of SMEs.

e. Environmental Management Capability (EMC)

Thanki & Thakkar (2018) considered the organizational capability and resource base of SMEs as the crucial critical success factor for small and medium-sized firms in environmental engagement. SMEs need robust environmental management capabilities (assets, skills, and technologies) to make them able to meet the environmental demands of stakeholders more decisively and timely.

Figure 3: emergent themes of these sustainability drivers



Source: authors' compilation using MindView8 software

Discussion

This paper discussed that there are only a small number of studies that focused on the sustainability issue in small and medium-sized enterprises, while most of them have primarily investigated sustainability practices with a focus on large enterprises. However, SMEs are the backbone of each country and play an important role in the global economy. Therefore, it is surprising that the sustainability of SMEs has received little attention from researchers compared to large companies.

This paper provided a comprehensive list of the external & internal drivers (both major drivers or secondary drivers) of sustainability practices in SMEs based on a Systematic Literature Review technique and thematic analysis. The major external drivers include Government, customers, networks and alliances, suppliers, communities, and competitors, while the major internal drivers are employees, organization culture, brand image and reputation, competitive advantage, strategic intent, and environment management capability.

However, apart from these drivers, some factors such as the future importance of environmental practices and technological up-gradation of SMEs could not be categorized into these two blocks, while literature proved the importance of these factors in driving SMEs towards sustainable practices and increasing their profits through enhancing their operational efficiency.

It is true that transforming into a greener organization requires more investment in technology developments, employee training, and a reconstruction of the organizational structure, however, as we discussed in analyzing the internal drivers of sustainability practices, if SMEs adopt environmental practices mainly due to strategic intent and focus on long-run financial and market position payoffs, they can be still beneficial.

Moreover, SMEs have faced some problems in implementing sustainable practices. The lack of financial resources, low environmental awareness, weaker governmental regulation, and culture are examples of certain barriers & constraints in implementing sustainable practices in SMEs.

Furthermore, this paper has a practical suggestion for policymakers as well as for SME owners and managers. The regular sustainability reports in Sustainable Development Goals templated can help them to be transparent in their sustainability strategy and signal to society their efforts in environmental and social targets which in turn can have positive effects on their financial outcomes.

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Sustainable Business Models

Based on the Sharing Economy Research of Chinese Practice

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Abstract

With the wave of technological innovation, the rapid development of global network technology has provided more powerful technical support for various business activities. In the business environment of this wave of innovation, a new sustainable business model was born—Sharing Economy. The sharing economy provides a new way of thinking about business models, exchange economies, value sharing and community networks. The emergence of a business model that combines online and offline has changed people's consumption habits and product acquisition methods. The sharing business model has gradually become an important way to solve the problem of global sustainable development. In recent years, the influence of the sharing economy business model has continued to expand, creating a lot of value for enterprises. This paper analyses the practice of the sharing economy in China through case study, so as to provide the reference for sustainable corporate development.

Keywords: Sharing economy, business model, O2O, sustainable development

Introduction

With the change of people's consumption habits, consumers began to explore new ways to obtain the right to use goods, which promoted the discussion of the relationship between the sharing economy and commercial activities. Different from traditional market transactions, sharing economic business activities are consumption behaviors that do not aim at transfer of ownership. Discussing the importance of the sharing economy is often inseparable from a focus on the business models that come with it. The sharing economy is based on the Internet platform, and individuals or organizations transfer the right to use idle items in a short period of time for the purpose of economic benefits.

The concept of the sharing economy was first introduced in 1978. Demally (2014) pointed out that sharing economy main manifestation is the transfer of ownership of unused goods through resale and exchange. As the Internet plays an increasingly important role in the distribution of resources. Botsman (2011) thought sharing economy is characterized by the separation of ownership and use of goods by means of leasing, which emphasizes the use of goods rather than the possession of goods, but not all goods can be shared. Bonciu (2016) studied that sharing economy will have a great impact on the development of the economy. On the one hand, the number of participants in the sharing economy is large and widespread, and everyone can make full use of existing resources through sharing. Rifkin (2014) describe the sharing economy as a zero-marginal-cost economy that brings together economic production activities that are otherwise fragmented through an Internet sharing platform, and includes not only tangible goods with profit value, but also intangible goods without profit value, such as knowledge and technology. They believe that the sharing economy is a revolutionary breakthrough in the economy and that sharing networks will soon be established worldwide.

The concept of the sharing economy emerged relatively late in China (Gao&Guan,2006). On the basis of the research of foreign scholars, Chinese scholars have carried out research on the sharing economy according to the domestic situation. The research direction mainly focuses on the driving factors of the sharing economy and the business model of the sharing economy. Yang (2016) believed that the global economy has entered a period of weakness after 2008, and market demand has driven the rise and development of the sharing economy. It is the main driving force for the development of the sharing economy. Dong(2016) pointed out four conditions for the development of the sharing economy: first, the establishment of a sharing platform; second, the existence of idle resources; third, the popularization of the concept of sharing; fourth, the improvement of the credit mechanism. Luo and Lu(2010) argue that institutional innovation has enabled the sharing economy to benefit the masses, and

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that three prerequisites for the development of the sharing economy in China are the increasing improvement of the market economy, the strengthening of market-based government, and the improvement of credit mechanism protection. Qin(2016) analyzed the operation mode of sharing platform enterprises, and proposes that the Internet sharing platform is at the core of the sharing economy business model, and the supply and demand sides of products/services conduct transactions through the sharing platform.

The studies of the sharing economy from scholars, it is clear that the sharing economy emphasizes the reduction of transaction costs, creating opportunities for those who couldn't afford the capital to reap the benefits and maximizing the use of resources that would otherwise be idle. Zhang (2016)thought sharing economy would provide a large amount of labor for productive activities, resulting in significant productivity benefits.

Understanding of sharing economy and business model

By summarizing the literature, it can be known that the sharing economy is driven by information technology. With the help of an intermediate platform, the supply side and the demand side of idle resources are linked to realize the paid temporary transfer of resources.

Compared with the traditional e-commerce or leasing industry, the sharing economy has a strong non-intermediary feature. The traditional e-commerce industry adopts highly centralized management and distribution (Huang & Ran,2016). The employees of the enterprise belong to the enterprise and indirectly provide various services to the demands. Under the sharing economy, the demand side and the supply side can form a direct connection, the platform does not need to exist as an intermediary, and the supply side does not need to be affiliated with the enterprise.

The sharing economy platform has become a new intermediary between the labor side and the demand side (Jiang, 2014). This intermediary builds a crowd sourcing platform that connects the supply and demand sides. It does not pay wages to the supply side or the demand side, but the demand side directly gives the supply side a commission, and the commission Part of it also includes paying a certain service fee to the platform to help them participate in shared services. Traditional suppliers can develop themselves on the sharing economy platform without being limited by the traditional enterprise system (Kathan W,et al.2016). At the same time, suppliers are not limited to a single platform, but can work on different platforms at the same time, so as to obtain multiple parties. Benefit. This also enables suppliers to control their own time, thus producing better service.

Characteristics of the sharing economy

Ownership sharing

The most significant external feature of the sharing economy is the change in the temporary ownership of idle resources it brings (Zheng,2016). Through the sharing economy platform, consumers can temporarily own the temporary use rights of various commodities. Compared with consumers purchasing corresponding commodities by themselves, the benefits of temporary use at low prices are more significant and intuitive. In addition, this also avoids the waste of idle resources, and can better reflect the practical value of the commodity itself.

Relying on the internet

The sharing economy platform is based on the rapid development of the Internet (Qiao,2016). At the same time, the innovation of information technology and the promotion of the application level have greatly promoted the development of the sharing economy. The Internet is both its foundation and its driving force.

Non-intermediary

In the sharing economy, the two parties involved in the transaction can communicate directly and generate a transaction relationship without the participation and reconciliation of an intermediary. All participating traders can quickly and directly obtain the information they want. With the rapid development of the Internet, this non-intermediary transaction method appears to be more equal and directly avoids the emergence of monopoly.

Uncertain supply and demand

Compared with the traditional business model, the roles of the supply and demand sides brought about by the sharing economy are not static, and the people on the supply side can also be the demand side. As a result, the marginal cost of services traded by both supply and demand can be reduced, resulting in savings.

Sharing economy business model—O2O

Business model is the basic logic of enterprise value creation. It specifically shows that the enterprise adjusts or plans the structure and operation of the organization to obtain profits. In practice, business models are often linked to the production elements required for the normal functioning of the organization, so as to achieve the effect of maximizing the consumer benefit of the product or target through internal and external integration.

The O2O means online to offline. The O2O business model is a typical representative of the sharing economy business model. Under this model, enterprises can connect offline resources with demanders through their own platforms and use information technology to enhance user experience. It can not only make the precise connection between demand and supply, but also realize the timely and accurate delivery of various kinds of information (Luo. & Li,2015). The sharing economy business model has various attributes, such as authenticity, openness, interactivity, etc., which reflects the vigor and vitality of the sharing economy business model.

Driving factors of O2O business model

Reuse of idle resources

Idle resources are the objects shared by the sharing economy, and it is also the reason why the business model of the sharing economy is widely promoted (Li,2012). Limited by the scarcity of resources, it is always difficult for people to obtain what they want in time, and at the same time, their desires are infinite, so people always have inexhaustible things. The sharing economy takes out the idle resources and temporarily transfers them to those who need them, so as to realize the reuse, which not only meets the profit demand of the supply side, but also meets the temporary demand of the demander for materials or services, and also makes the transaction object has been fully utilized to achieve the purpose of saving.

Demand for socialization

People are more inclined to a social lifestyle, and therefore have more needs for social interaction. People's social interaction can meet people's needs for communication, and at the same time, they can also obtain various information in communication with all kinds of people (Wang,2011). In the operation of the sharing economy, the importance of social networking has been further reflected. Buyers and sellers obtain the most original information of each other through direct communication, which not only reduces the cost of communication, but also improves the speed of communication. This communication method has played a strong role in promoting consumption.

Internet technology innovation

The birth and development power of the sharing economy comes from the Internet. Due to the efficient and accurate processing of data by the Internet, the platform can accurately and effectively convey all kinds of information to all parties. On the O2O platform, Internet innovation is mainly reflected in the matching between supply and demand and the corresponding guaranteed scheme. The O2O platform needs to quickly and safely transmit the information of both the supply and demand sides, and at the same time, it also protects the information problems of merchants and individuals who trade on the platform.

Sustainable Development Goals

The sharing of idle goods, which is advocated by the sharing economy, reflects the concept of sustainable development (Wu,2013). Since the use of idle resources does not require re-consumption of new resources, resource consumption is also reduced. The O2O business model also avoids the waste of resources and environmental pressure caused by the abandonment of useless resources, reduces greenhouse gas emissions, and achieves the goal of sustainable development.

It could be summarized that O2O business model in terms of customer relationship, the supply and demand sides collaborate based on the online community of user groups with specific relationship; in terms of core business behavior, it gradually changes from traditional "product-oriented" to "customer-oriented"; in terms of profit model, value is created by using the relationship network; in terms of marketing and promotion channels, the O2O model generates advertising methods embedded in the content at the request of users and broadens the marketing channels(Zhou,2016).

Case study

Through a case study of a Chinese sharing economy company——DiDi Travel, the paper will analyse the operation and profitability of its business model, as so to offer proposals for companies to develop the sharing economy.

Company profile of DiDi Travel

DiDi Travel is a mobile mobility technology platform. It is dedicated to actively collaborating with partners and communities in the cab industry and automotive industry around the world. The platform drives smart mobility innovation with localized artificial intelligence technologies and jointly solve global transportation, environmental and employment challenges. It currently provides diversified mobility services such as online taxi, cab hailing, chauffeured driving and hitchhiking, and operates car service, takeaway, freight and finance businesses in Asia Pacific, Latin America, Africa and Russia.

Operation analysis of O2O business model on DiDi Travel

From an operational perspective, consumers post their personalized ride needs on the DiDi Travel platform, and at the same time, DiDi Travel uses internet big data analysis and processing to organically match the consumer's needs with drivers who meet the relevant criteria. The platform pushes the consumer's order to these screened drivers, who can decide whether to take the order according to their own conditions. After passengers get off the bus, they pay for the travel and evaluate the driver based on the actual experience, and the driver accepts the fare and evaluates the passenger. This feedback will serve as a reference for other passengers and drivers.

Profit analysis of O2O business model on DiDi Travel

Order commission

The users of DiDi Travel platform include registered drivers and registered users. Every time a driver completes an order, DiDi Travel platform can get 20% of the platform service fee. Although the amount of service fee per order is small, the DiDi Travel platform has a large number of registered users and generates millions of orders every day. Therefore, the platform service fee is the main source of profit for DiDi Travel.

Placement of advertisements and social media

DiDi travel has a large customer base, and by posting other companies' advertisements on its own platform app, it collects advertising fees and makes profits. On the other hand, because of its huge customer base, customers have social demands. DiDi travel has a large number of users' travel data, and through the value of big data, it attracts many companies with related technology needs to cooperate and get profit.

Financial investment profit

When consumers use DiDi Travel platform, they will need to settle the fees on its platform. Due to regulatory requirements, DiDi Travel platform needs to delay the receipt of this part of the funds. Therefore, DiDi Travel uses the funds of the capital pool for financial investment, so as to obtain other profits from the non-consumption model.

As we know, DiDi Travel is a typical representative of the sharing economy. On the basis of O2O, its business model also conforms to the characteristics of asset-light operation. The enterprise itself does not have the goods (cars, etc.) to provide services, but integrates the resources of private cars from all walks of life in the society. Drivers with idle vehicles can register as users and make profits; DiDi consumers post their needs through the DiDi Travel platform, and the platform will organically match supply and demand to complete orders. DiDi Travel subdivides driver vehicles and provides consumers with a variety of choices of different grades and prices to meet the diverse needs of consumers.

Proposals of developing sharing economy

From the above cases and scholars' research on the sharing economy, the following proposals are summarized to further improve the business model of the sharing economy and achieve sustainable development goals.

Multi-method marketing

The promotion approach widely adopted by the sharing economy is to connect people with consistent consumption needs. With the improvement of information technology, social software not only strengthens the communication between people, but also strengthens the functions of office, teaching and other fields. The promotion of social platforms and the Internet can effectively alleviate this problem and make it easier and timelier for consumers to see all kinds of information released by sellers. Based on consumers' consumption data, consumption information, and consumption evaluations, the seller group can achieve fair competition and update products or services in a targeted manner. Buyer groups can find exactly the products or services they need according to their own needs.

The sharing economy shortens the distance between buyers and sellers, and both parties can achieve precise docking.

Establish regulatory system

If the sharing economy wants to develop smoothly, it must have a corresponding regulatory system to guarantee it. Under the transaction model advocated by the sharing economy, the transaction platform needs to ensure the credit security of both consumers and suppliers to a certain extent. Because in the sharing economy business model, both buyers and sellers do not know each other and rely on the credit of both parties to conduct transactions and services, so credit has become the premise and foundation of all cooperative transactions. In addition, under the shared business model, the information of both buyers and sellers is in the shared platform. Therefore, it is very important for the sharing platform to guarantee the information security and the beliefs of both parties.

Conclusion

The sharing economy provides a new way of thinking about business models, exchange economies, value sharing and community networks. The emergence of a business model that combines online and offline has enabled the emerging business model of the sharing economy in the O2O environment to change people's consumption habits and product acquisition methods. Compared with traditional forms, the sharing economy is fresh and different, and it also enables people to share their tangible and intangible idle assets to more meaningful places. People are more concerned about the use value and demand acquisition of products, rather than Ownership of products through buying and selling. Through the O2O operation platform, the consumption process is more data-based, mobile, and socialized, realizing the sharing economy emerging business model.

From an individual point of view, under the O2O system, everyone can be a producer and everyone can contribute to society. From the perspective of enterprises, the concept of sharing and saving provides new ideas for enterprise development and accelerates enterprise transformation. As a new business model that saves resources, the sharing economy shows the goal of sustainable development of global enterprises and brings major changes to different industries.

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