Sustainability at NTNU

How to get students to contribute to a more sustainable NTNU campus?

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ABSTRACT

Sustainable development has become one of the most contested subjects of today. On the 29th of September, this year DNV GL published a comprehensive report stating that "The world does not meet any of the UNs sustainable goals". This despite of an increased global focus on sustainable development the last years. Universities all over the world have acknowledges the sustainable challenges and how important it is for them as learning facilities to be frontiers within sustainable development. NTNU is one of these universities. In 2014 they made sustainability to one of the four strategic research areas for 2014-2023. NTNU aim to be an international player in society, providing research-based contributions into decision-making processes within politics, business and society at large, e.g. towards the UN, the EU 2020 Strategy and Norwegian climate policy. Research shows that NTNU have many ground-breaking research project, but the sustainable status on campus needs to be improved. The most important key to reach the goal of becoming a more sustainable campus, is by the contributions from students attending NTNU. This article will first introduce sustainable development, before it considers sustainability in universities, and NTNU, in an attempt to uncover key factors and strategies to how we can get student to contribute to a more sustainable NTNU campus.

KEYWORDS: Sustainability, NTNU, student contribution, changing behavior, motivation

1. INTRODUCTION

Sustainability is one of four strategic research areas at NTNU for the period 2014-2023. The program is going to bring together the best minds, from a range of disciplines, to create the knowledge needed by society to understand and change unsustainable patterns of behavior and development.

In a globalizing world of limited resources and unlimited ingenuity, universities play a vital role in preparing students to meet the sustainability challenges of the future. [1] " "Behaviour and values learnt at university have a long-lasting impact on graduates throughout their lives"." Louise Hazan, People & Planet campaigns and communications manager for climate change [2]. There is without a doubt important for educations institutions all over the world to address their responsibility in

sustainable development. From a critical point of view, the people coming out of the world's best colleges and universities, are the people leading us down the current unhealthy, inequitable, and unsustainable path. [3]

Student represent on NTNUs board and sustainable development enthusiast, Christian Tangene, said in an interview that universities are the source of knowledge about the problem, and the source to finding solutions. "They are the source of knowledge about the problem, and the source to finding solutions". Further he adds that universities most important responsibility, is to secure a sustainable development. [4]

Higher education institutions have a profound, moral responsibility to increase the awareness, knowledge, skills, and values needed to create a just and sustainable future. NTNU has recognized their responsibility, and aims to be an international player in society within sustainability. Their goal is to provide research based contributions into decision making processes within politics, business and society etc., towards the UN, the EU 2020 Strategy and Norwegian climate policy. NTNU wants to further develop high quality research groups into taking an international leadership role in their fields. [5]

NTNUs focus on sustainability should not only appear through major research projects and new technologies, they also want the university to emerge as a sustainable campus. To be a sustainable campus, they depend on with the students. So how can NTNU get students to contribute to a more sustainable campus?

1.1 Why students?

The number of students around the globe, enrolled in higher education, is forecast to increase to 262 million by 2025. [6] A student is the definition of a person who is learning. You study to learn something that you can use for further studies and work situation.

So why are students' important actors in the mission of making NTNU a more sustainable campus? NTNU are registered with about 39 000 students in 2016 [7]. That means that students represent the largest group of people on campus. Student activities and initiatives can have a significant impact on increasing awareness and changing behavior at a university. They can be key actors of making a difference in important and relevant themes, such as sustainability. Sunniva Bratt Slette from NTNU Sustainability said: "It is very important that students use their role as gifted and future-visionary people to put sustainability on the agenda. Students have great power through a variety of channels: student politics, volunteer positions, trades, custom projects, participation in conferences and contribution to public debate."

This article focuses on defining sustainability and the challenges the world are facing today, the universities role, sustainability at NTNU and how to get students to contribute to more sustainable NTNU campus.

2. SUSTAINABILITY

Sustainable development has become one of the most contested subjects on development discourse in the last decade or so. [8] Today we are constantly reminded of the sustainable challenges we are facing, sustainability is the current frontier of our societies. Awareness of

what needs to be done to meet these challenges is a major focus all over the world. The word sustain means to keep in existence; maintain, continue, or prolong. These are all important keywords that can be translated into the meaning of global sustainability.

2.1 Definition

The concept of sustainable development received its first major international recognition in 1972 at the UN Conference on the Human Environment held in Stockholm. The term was not referred to explicitly, but nevertheless the international community agreed to the notion - now fundamental to sustainable development - that both development and the environment, hitherto addressed as separate issues, could be managed in a mutually beneficial way. [9]

In 1987, 15 years after its first recognition, sustainability was put on the international political agenda in the report "Our common future", better known as the Brundtland Report. The term sustainability has ever since gotten many definitions, but the original definition was as the following:

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. [10]

The purpose of the report was to form the basis for international cooperation on global environmental and development problems. To achieve the objectives of sustainable development must be the international community to work in several fields simultaneously. Sustainable development is based on three pillars:

Figure 1. The three pillars of sustainable development.

[11]

The Brundtland report increased the highly-needed focus on sustainability. It broke the mould by replacing the confrontational and sometimes rancorous debates that had previously prevailed with a more constructive approach to environment and development issues. The report offered people hope by purporting to show how existing, yet apparently conflicting, aspiration might be harnessed together, and how they might be framed as a part of a common goal. [12]

The UN Conference on Environment and Development held in Rio in 1992 elaborated on some of the key concepts encapsulated in the Brundtland definition. Among these was the adoption of the "precautionary principle" which stipulates that:

- No environmental action should be taken which was not reversible
- Designers should use the best scientific knowledge available
- Scientists had a duty to develop environmental knowledge
- Ignorance was no defense under international law for ecological damage.

There were far reaching implications for the development industry. The 2002 Johannesburg World Summit on Sustainable Development then introduced the concept of "sustainable consumption and production" leading to several international agreements. The key principle was to establish a link between productivity, resource use and levels of pollution. Specifically, the agreement was about:

- Ensuring that economic growth does not cause environmental pollution at a global and regional level
- Improving efficiency in resource use
- Examining the whole life cycle of a product
- Giving consumers more information on products and services
- Exploiting taxation and regulation to stimulate innovation in clean technologies. [13]

In September 2015, the United Nations adopted the new Sustainable Development Goals (SDGs) for the year 2030, setting an ambition for a safe and sustainable future for everyone, and especially for the less privileged people on earth.

The 17 goals for 2030

1. No Poverty
2. Zero Hunger
3. Good Health and Well-being
4. Quality Education
5. Gender Equality
6. Clean Water and Sanitation
7. Affordable and Clean Energy
8. Decent Work and Economic Growth
9. Industry, Innovation and Infrastructure
10. Reduced Inequalities
11. Sustainable Cities and Communities
12. Responsible Consumption and Production
13. Climate Action

14. Life Below Water
15. Life on Land
16. Peace, Justice and Strong Institutions
17. Partnerships for the Goals

The 17 goals provide a global framework for action, and governments, organizations and individuals everywhere are indeed starting to act. [14]

2.2 Current state

A key word in the definition of sustainable development is "future". In the theme of sustainability, it is a lot of talk about the future and the future generation, and what we can to make a better future. But if we always talk about the future, what about the current state and what we can do now.

On the 29th of September, this year the Norwegian newspaper, VG, published a report developed by analysts at DNV GL, The Norwegian Veritas. The report had the title:

Stor FN-rapport:

Verden når ikke FNs bærekraftmål

Figure 2. VGs headline 29.09.16.

"The world does not meet the UNs sustainable goals". The comprehensive report shows that our global health is clearly improving. Especially within renewable energy, where prices are reduced and supply has increased significantly in recent years. But more important, it states that none of the UN sustainable goals (SDGs) will meet the "deadline" in 2030, unless efforts are intensified significantly. [15][16]

There are two goals that the report brings out to most certain not to be reached within 2030 The first one is number 10. Reduced Inequalities. The report states that the earth is hopelessly lagging on this goal. 62 people own as much as 3.5 billion people in the other part of the scale. The development is really going the wrong way. The other goal is number 13. Climate Action. Although many countries now take responsibility and set specific targets to reduce CO2 emissions, the prognosis from DNV GL is discouraging: too little are being done, and too slow, despite the Paris agreement and techno-optimism.

It may also be interesting to point out that number 11, Responsible Consumption and Production, is one of the most critical points. The countries with the lowest prosperity meets the goal, while we in the western world are the worst offenders. Paradoxically, because the ecological "footprint," the consumption of goods and services is very low compared to the rest of the world.

The Norwegian prime minister, Erna Solberg, said in an interview after the report was published that:" There are many good individual stories, such as solar energy and giving hope of access to sustainable energy in developing countries. But much remains to be done before we can reach the target, both on the technology, systems and organization" [15][16]

2.3 Universities role in sustainable development

So where do universities come in dealing with the no-ending challenges facing the worlds future? Anthony Cortese wrote an article called *Critical Role of Higher Education in Creating a Sustainable Future* where he points out that:

"Higher education has unique academic freedom and the critical mass and diversity of skills to develop new ideas, to comment on society and its challenges, and to engage in bold experimentation in sustainable living."

Cortese wants higher education to take a leadership role and prepare students and providing them with the information and knowledge they need to achieve a just and sustainable society. Further he establishes that with doing so, the education of all professionals would reflect a new approach to learning and practice. Giving a college or university the chance to operate as a fully integrated community that models social and biological sustainability itself and its interdependence with the local, reginal, and global communities. He presents this figure.
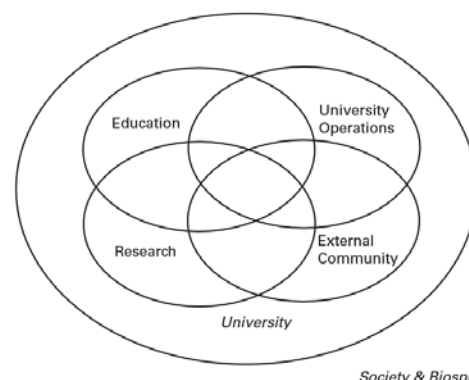

Figure 3. A fully integrated system in higher education.

Showcasing that teaching, research, operations, and relations with local communities are connecting. Students learn from everything around them, and all these activities form a complex web of experience and learning. [3]

2,4 The International Sustainable Campus Network (ISCN)

As mentioned in the introduction, NTNU has acknowledged the challenges of sustainable

development, and made it one of their four strategic research areas from 2014 till 2023. NTNU is far from the only university to have chosen to increase their focus on sustainable development, and wanting to be known as a sustainable campus. Along with 80 other schools from all around the world, they are a member of The International Sustainable Campus Network (ISCN). ISCN provides a global forum to support leading colleges, universities, and corporate campuses in the exchange of information, ideas, and best practices for achieving sustainable campus operations and integrating sustainability in research and teaching. [17]

To achieve sustainability objectives to a campus and to obtain successful results, one need to be able to think again – be innovative. A new approach to campus activities should embrace fundamental values to maximize efficiency, eliminate waste, and generate positive returns - either as direct cost savings or other intangible benefits, such as more comfortable classrooms or timesaving technology. [18]

2,5 Sustainable practices at universities

In the rapport "Best practice in campus sustainability" from 2014, The International Sustainable Campus Network presents examples of sustainable projects from their member schools. Looking through these examples most of them are major projects, often regarding sustainable constructions and main buildings on campus. For example: "Building Design Emphasizing Natural Ventilation for the Tropics" at NUS in Singapore, or "The World's First Solar Window" at Ecole Polytechnique Fédérale de Lausanne in France [19]. These projects are large in scale,

take a lot of time, cost a lot to finish and are decided by the administration.

It is not a given that universities need to be a member of ISCN to be recognized as a sustainable campus. Universities all over the world have recognized how they can contribute to a sustainable development by making it a focus on their campus. In an article about "Green Universities", writer Laura Bridgestock comes up with a handful of examples of initiatives that green universities do to become more sustainable:

- Sustainable building design
- Renewable energy
- Water bottle re-use
- Locally produced food
- Waste disposal
- Green transport
- Awareness-raising events   [2]

Boston University, is just one of these universities. At BU sustainability, has been one of the university's focus areas since 2007. The committee of Sustainability came up with three objectives that was going make BU a sustainable campus:

1. Promoting sustainable practices on campus through education, research, activities, development and operation, with a goal of making sustainability integrated to Boston University
2. Engage campus through an ongoing dialogue on sustainability and improve communication across all departments at university
3. Building a culture of sustainable long-term and future-oriented planning [20]

Among their many projects highlighted on their websites, is an *Earth House.* A combination of student home and live-in classroom for

sustainable development. The Earth House has a mission to provide a living environment that conserves energy and water and minimizes waste, to reduce the carbon footprint of the residents. Residents will look to promote sustainable living and awareness throughout BU's campus. The idea is that the knowledge students get by living in the house for one year, are going to influence them in to taking sustainable choices for the rest of their lives. [21]

Another project is the invention of the app *Sustainability@BU*. The app is developed so that players can track their everyday actions, giving them points based on how sustainable the actions are considered. Players can compete with other players or just against themselves. The mission is to give the players, students and employees at BU, a chance to get more aware on the footprints they take every day and how they can make more and better sustainable choices. [22]

3 SUSTAINABILITY AT NTNU

Since 2014 and the establishment of NTNU Sustainability, the focus of making NTNU more sustainable, has naturally increased. On their website, they describe their ambitions as the following:

"NTNU aims to be an international player in society, providing research-based contributions into decision-making processes within politics, business and society at large, e.g. towards the UN, the EU 2020 Strategy and Norwegian climate policy. NTNU wants to develop high quality research groups further into taking an international leadership role in their fields." - NTNU Sustainability [5]

The attempt to map the sustainable status at NTNU, led to several on-campus observations

and reaching out to relevant people working with sustainability on campus, mainly NTNU Sustainability and The Forum of Young Scholars in Sustainability, along with a survey given to 150 random students on campus Gløshaugen. The purpose of the survey was to assess students' general interest in sustainable development and what their thoughts around NTNU sustainable campus.

3,1 Research areas

Just as most other universities - a lot comes down to the research areas at campus. What the university choose to research on, decides at the same time what the NTNU will spend money on, and an automatically increased focus within that particularly search field. A successful research will also give more attention giving the university a higher status as an educational institution.

At NTNU there are ongoing research projects within several of the most important areas of sustainable development. NTNU's research on sustainable development includes the three pillars sustainable development is based on, environmental, economic and social aspects in the broadest sense. Examples of research at NTNU is the Industrial Ecology Programme. A programme with its basis in environmental systems analysis and climate research, may constitute the core in development and use of environmental and sustainability assessments on different levels. Another example is the Centre for Biodiversity Dynamics. This is a collaboration between biologists and mathematicians, with the goal of finding answers to how animal populations vary, and how human activity influences biological diversity. It is important to understand these dynamics, and to use scientific methods, so that we can have an understanding of the

complex interaction between urban development, infrastructure and modern communication. [5]

3,2 Sustainable challenges

NTNU has for sure succeeded to bring sustainability on the field, but they are still facing many challenges to be a more sustainable campus. On the question: "what are the biggest sustainable challenges at NTNU?" NTNU Sustainability responded:

"The main challenges are to improve the waste management of both conventional and lab-related waste. There are also challenges related to emissions and congestion caused by the transport of goods and people to and from campus. There is reason to believe that better information provision could have contributed to greater commitment to sustainable campus." - NTNU Sustainability

The same question was asked to the leader of The Forum of Young Scholars in Sustainability (FYSS) at NTNU. He points out these three challenges on campus:
"One: The sense of accomplishment: (When we think that we have achieved our goals then we hinder our growth to see the possible betterments, just like one should always remain a student in his/her life, the policy makers should always thrive for the betterments). Two: Over consumption of papers, food, tissue papers, etc. Three: I do not know how students follow the sustainable thinking in their lifestyles, whether they are aware of the impacts of their own actions?" – Paritosh Deshpande leader of FYSS

NTNU has still some way to go to reach its full potential as a sustainable campus. This is confirmed by the committee of NTNU

Sustainability. They point out some specific examples of the remaining on-campus challenges, such as return points for recyclable waste materials are not available in all buildings. It is also room for improvement in the canteens and shops at campus in serving environmentally friendly food and products and still not all vehicles owned by NTNU are electric. After the recent merger with the campuses in Ålesund and Gjøvik, a lot of travelling between the three campuses could be reduced by better equipment and systems for videoconferencing.

3,3 NTNU Students interest for sustainability

In the introduction, it was said that students are the largest group on campus. In 2016 NTNU was registered with about 39 000 students. No genius is needed to understand that if NTNU want to be a more sustainable campus, students are the key in making that a reality.

Students at NTNU have a reputation to be among the best in the country, and it would seem possible to engage a large group of young people eager to contribute to a more sustainable campus. On the question about the NTNU students sustainable interest, NTNU Sustainability have the impression that a lot of NTNU students are in fact, interested in sustainability. This is shown through the strong involvement around case competitions dealing with sustainability, through companies such as Siemens, Kongsberg and GrEn through Start NTNU. But they point out that at the present, it is still a big step forward for sustainability to get a comprehensive and obviously, part in a student life. There are other universities that has come longer within this area of development on campus, as Boston University mentioned earlier in the article.

A walk around campus reveals several sustainable initiatives with the mission to meet the influence students. There are bins that encourage recycling, information signs next to sinks and copiers to limit consumption, the bicycle parking is full and eco-friendly or fair trade food and drinks in the kiosks and serving places. These are all very general sustainable advises, but far from revolutionary.

There are several factors that indicate that NTNU still has a long way ahead to reach out to students. Yes, there are many students contributing to the research projects organized by NTNU, choosing academic disciplines in sustainability, renewable energy, eco-design, etc. and engaging themselves in politics and sustainable activities, but the majority is not.

In a survey on campus Gløshaugen, given to random students, less than 30 % said they knew sustainability was a strategic focus area at NTNU and only about 11 % are active contributing in sustainable activities. Every student said they have heard about sustainable development and knows some reasons of why it is one of the most important topics in the world today. Another positive finding is that 89 % answered that they believe they could be more sustainable without it having a negative effect on their existing lifestyle. This be an indicator of willingness among students and a potential NTNU need to address, if they want to get the students contribution on campus. But changing people's behaviour to something new, is a complex and difficult challenge.

4. CHANGING BEHAVIOR

Changing human behaviour is a well-known challenge. Buckminster Fuller, a renowned 20th century inventor and visionary, said: "If you want to change how someone thinks, give up; you cannot change how another think. Give

them a tool, the use of which will lead them to think differently." [23]

4,1 Sustainable behaviour

In the book, *Sustainability by Design*, the author John R. Ehrenfeld, introduces a new definition of sustainable development. He defines sustainability "*as the possibility humans and other life will flourish on the Earth forever.*"

Ehrenfeld is highlighting humans' responsibility. Sustainable behaviour can be so much. From handling, huge themes, such as global heating, and the disappearance of the tropical rainforest, to sorting waste in private households, but the meaning behind and the goal is to contribute to make world more sustainable. Every day we face suggestions to make you do more sustainable choses and how you can dedicate yourself to a more sustainable lifestyle.

But no matter which sustainable action a person would like to do, it most likely means a change in behavior. Although people's opportunities and decisions are constrained by various factors, of which some are necessarily beyond their control, it remains true that they alone bear responsibility for change in their environment [8]. To change our behaviour as individuals and as a society, we must find ways to break out of that pattern. Ehrenfeld write: "Sustainability can emerge only when modern humans adopt a new story that will change their behavior such that flourishing rather than unsustainability shows up in action." [23]

4,2 Motivating students

Motivating students to make a change, can be a true challenge. Motivation is defined as "the biological, psychological and social factors that activate, gives direction to and maintains behavior in various levels of intensity to achieve a goal." An example on a well-known theory in the field of motivation is Abraham Maslow and his hierarchy of need. Maslow operates with five basic needs: (1) physiological, (2) safety and security, (3) love and social ties, (4) recognition and positive self-perception and (5) self-actualization. These needs are the basis for every human motivation. The strength and dominance of needs varies from person to person and can occur due to both internal and external causes. Maslow also claims that when a need is satisfied a new one appears, but emphasizes that motivation is a complex phenomenon in which the interaction between the various needs is important. [24]

Two Norwegian professors, Kuvaas and Dysvik, distinguishes between internal and external motivation. The most important difference is whether the main source of motivation is located inside or outside the activity itself.

Figure 4. The forces that makes people motivated

[25]

A student's life is busy, low in cash and often a self-centered time of a person's life. In a perfect world, every student would be interested in making the world a better place, willing to do volunteering work, but the truth is that most people, are driven of behaviors that in the end would benefit them. It is not without a reason that most surveys are luring people to answer with high profiled prices, such as "answer and win a smartphone". Most people are self-centered, and are willing to do more if it benefits themselves. If we go back to the previously chapter, this can also be one of the reasons why students at NTNU shows strong involvement around case competitions dealing with sustainability for well-known companies. Students are always encouraged to get relevant contacts and build network with the relevant people in industries in a competitive environment.

The book *Sustainability: A reader for writers* they present three ways that sustainability can be invisible. Taking these into a student perspective, will point out some of the most fundamental challenging factors in why it can be hard to motivate students to be more sustainable.

The first way is **time**. Since sustainability involves preserving resources for future generations, people of today must know (and care) what the future will look, but sometimes they can´t see the future. The consequences are often too far removed in time to seem real.

The second way is that the consequences of action are often far away in **space** rather than time. In an interconnected system, the consequences of action can occur across continent or the planet, and the connections between pieces of the system can be hard to see.

The last way is that sustainability can be invisible because it is so **ordinary**, so small or so taken for granted. A good example of this is

water. Unless their water bill is high, few people worry about their water consume. [26]

5. HOW TO GET STUDENTS TO CONTRIBUTE?

To get students attention and making them wanting to do changes in their life at campus, and so on contribute to a more sustainable campus, they need to be constantly reminded and motivated. Young people, such as students, tend to or strive to live in the moment. Their thoughts about future are dominated of how to get through the semester in the best way, and maybe on how their individual life will change when they are graduated. It is not synonymously as saying that they don't care about sustainable development, is just that they for example needs more guidance and examples on sustainable actions that after a while turn into their daily actions.

As *NTNU Sustainability* also said: "There is reason to believe that better information provision could have contributed to greater commitment to sustainable campus". When less than 30 %, knew that sustainability is of NTNUs four themes of focus. That is a way too low percent, considered it has been a focus theme since 2014 and indicates clearly that NTNU must step it up and make the focus on sustainability more visible at campus. There is no doubt that NTNU have taken many important steps in the right direction. This is shown through several groundbreaking research projects. But compared to other universities, such as Boston University, NTNU need to exploit their position as Norway´s largest university further and to be a more sustainable campus, there is a lot of work remaining. Not all students have the option or the interest of working with sustainability

within their education at NTNU, but they can all make more sustainable choices in their every life. The way of getting students attention starts with providing them with specific and accessible information. Step two is to develop more innovative and existing sustainable initiatives on campus, not just the "typical" advices people hear every day. Arrange bigger events, activities and competitions that brings out the competitive student that wants to be the best in everything. Focus on developing reasons to be more sustainable, so that student see that they can contribute without it having a negative impact on a student's busy schedule or economic status. Taking inspiration from the *Earth House* at Boston University, NTNU should aim to make the whole campus a live-in classroom for sustainability, with the goal that every student graduated, walks out with the sustainable behaviour that the future of earth so desperately need.

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