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## **REGENERATIVE FOOD SERVING SYSTEM FOR A SUSTAINABLE UNIVERSITY CAMPUS LIFESTYLE: A SOCIAL AND BEHAVIOURAL STUDY**

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### **ABSTRACT.**

Students and staff consume a staggering amount of food packaging daily with short lifespans lasting a few minutes before being thrown away. The paper created a regenerative system to improve university campuses' sustainable lifestyles in Egypt, focusing on the German University in Cairo (GUC) as a case study. The GUC is self-sufficient where services and products are produced on campus. However, attention is not given to packaging of food served. Therefore, the paper's main focus is on the system of serving food at the GUC with the aim of implementing the outcome on other campuses. The outcome targets youth who tend to follow trends easier and faster and lifestyles in universities will positively influence society. This research used behavioural studies on participants studying and working at the GUC to gain information about packages consumed daily. The system improves sustainability by reducing carbon emissions, money spent on packages, and landfill space.

Key Words: Food Packaging, Egypt, Sustainable Campus, Regenerative System.

## 1. INTRODUCTION

Workspaces including universities are home to materials with plenty of waste created each year. Campuses are a place where students and staff members eat several meals a day including their frequent drinks of water and coffee. Each time someone on campus buys something it comes in a pre-packaged container that normally lives for only a few minutes before it is thrown away. By developing campus waste management systems, universities in Egypt can begin the trend of sustainability which can improve not only the campus but the students' homes as well.

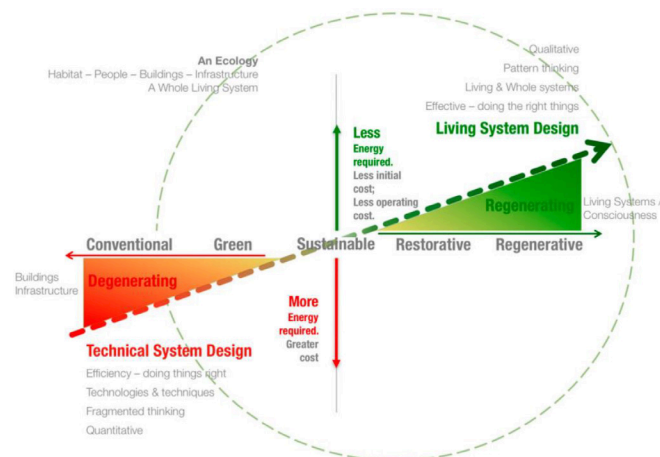
According to Ball and Taleb, the 72 million people living in Egypt produce at least 17 million tons of municipal solid waste a year (Ball & Taleb, 2011). The goal of this paper is to reduce and recycle municipal solid waste produced by university campuses in Egypt through the development of a regenerative food packaging system. By developing campus waste management systems, universities can begin the trend of sustainability which can improve not only the campus but the students' homes to influence society positively. The study will focus on the German University in Cairo as a case study, with the aim of implementing the study's outcome on other campuses.

## 2. REGENERATIVE SYSTEMS

### 2.1. Defining Regenerative systems

It is now apparent that action needs to be taken to solve our ongoing environmental issues. Sustainable systems maintain themselves to indefinitely sustain life support system that maintain human lives (Goodland, 1995). These systems are also known as maintaining themselves biologically, socially, or economically (Pearson, 2007). However, according to Reed, extreme changes must be created to achieve significant improvements (Reed, 2007).

Regenerative systems are developed using living systems to solve problems and involves interaction between several systems. According to Mang, the word regenerate involves a desire to improve, creating a new spirit, and energy going back to its origin. Designers are now being challenged to develop sustainable communities as a united system (Mang, 2001). It is a method that moves from thinking about reducing damage to understanding human's roles in service to finally regenerating new life, as shown in Figure 1. Regeneration understands healthy living systems that constantly produce new life sources. This is based on the thinking that humans evolve within systems and should be part of reviving and regenerating inside their own systems (Sheffer, 2017).



[Figure 1] Regenerative System Design according to Bill Reed, Regenes 2000-2016

## 3. CAIRO CAMPUS LIFESTYLE

### 3.1. Taboos in the Egyptian culture

Over packaging is not only a problem of one university but of the whole country. Egypt lacks a system that incorporates sustainable approaches. The Egyptian culture believes that more is better where it is considered impolite or taboo to show off your food, therefore, more packaging is used to protect food. On the other hand, in different Egyptian societies, people tend to be shy of reusable products and using their own utensils in public. Behavioural norms are also a factor when it comes to the waste that is produced in Egypt. While buying something from a shop, the cashier will always insist on giving a plastic container or bag, as a sign of generosity. Culturally, it is impolite to refuse these types of generousities or if they are refused they can be misunderstood.

### 3.2. Youth in Egypt

Egyptians are influenced by trends due to Egypt's the high population of youth who tend to follow trends easier and faster. In that case, introducing trends would be convincing and sustainable trends can be successful in the Egyptian culture. The Egyptian population consists of a large percentage of youth which will allow the study to address a large majority of the population by targeting universities.

According to Buckner, higher education in Egypt is the largest in the region where 2.4 million students were

found enrolled in post-secondary institutes or universities between 2009 and 2010 (Buckner, 2013). Choosing youth as a main user of the waste management system proposed will benefit our research because younger users are more likely to follow trends and to adapt to sustainable systems.

#### 4. EATING CYCLE ON CAMPUS: THE CASE OF THE GERMAN UNIVERSITY IN CAIRO (GUC)

The German University in Cairo is a self-sufficient university where most of its services and products including food products are produced on campus. Sandwiches, beverages, lunch, desserts and snacks are cooked, produced and packed in the GUC kitchen. However, not much attention is given to the packaging of the food served. The American University in Cairo’s Carbon Footprint report found 25% of solid waste produced by the university end up in landfills (Office of Sustainability, 2017). This backs up the need for establishing a reusable food packaging system.

##### 4.1. Food Preparation and Packaging

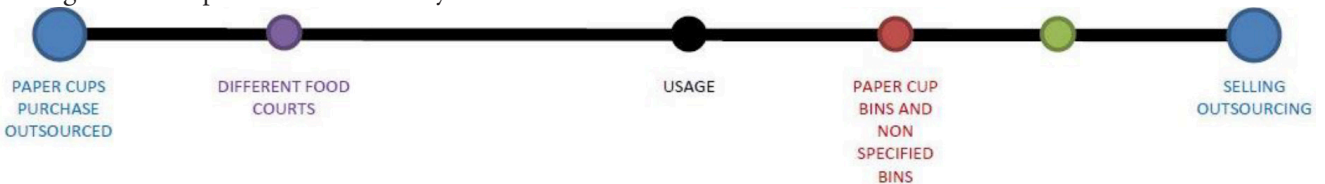
At the GUC, food is prepared by chefs at a central kitchen where it is then packaged securely and moved to different locations across campus. The packages used include cling film, cardboard plates, foam plates, paper cups, and plastic cutlery. Consumers buy the meals which are further packed into plastic bags to easily carry. The meals are consumed on campus usually within one hour of purchase. Water dispensers are provided by the university with regular changes of large water dispenser bottles as well as plastic water cups. Annually, the GUC uses 130,000 paper cups, 12,000 plastic cups, 130,000 plastic forks, 750,000 plastic spoons, and 45,000 plates (Waheba, 2017).

##### 4.2. Consumption on campus

According to a survey conducted with 75 participants ranging from ages 16 to 34 who are students and staff members of the GUC, 27% rarely bring their own food from home and 79% sometimes, usually or always buy food from campus. However, 65% of the participants prefer homemade food rather than fast food or food served on campus. 69% of participants do not reuse their food packaging. It was also found that the majority of the participants would use sustainable alternative for all food packages provided at the GUC and 84% would participate in tasks to help recycle package waste. Therefore, it was found that there is potential in introducing a sustainable system where people on campus are willing and keen on finding alternatives and improvements to the current system.

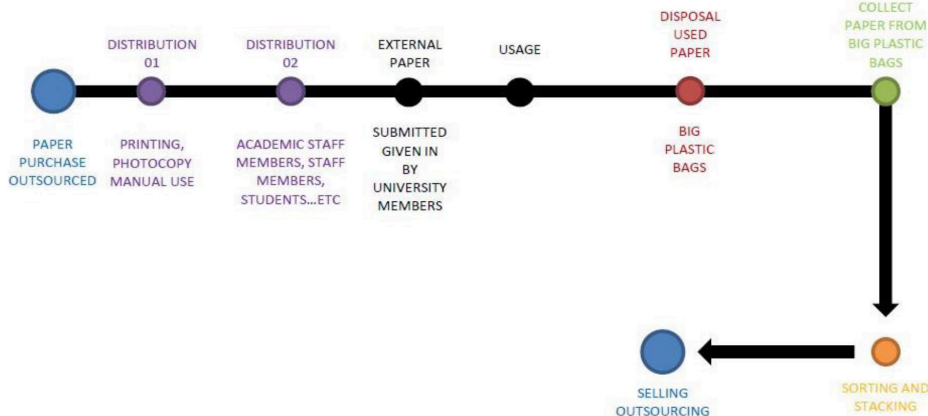
##### 4.3. Current Systems at the German University in Cairo

The current situation of waste at the German University in Cairo can be shown in Figures 2 and 3. As most of universities and academic entities, huge amounts of paper are used and wasted. The use of paper goes in many different directions: exams, assignments, office work, etc. Paper purchase comes in many different forms and is distributed through different parts of the university.



[Figure 2] The Current System for the GUC's Paper cups

Figure 2 shows the university’s current cup process as follows: paper cups are purchased from an outsourced manufacturer, then distributed through different parts on campus (cafeterias and coffee shops). After usage, paper cups are disposed in bins that are not specified to paper cups but are placed near by the coffee shop and cafeteria outlet. Afterwards, they are collected by the housekeeping department to be sold with the other collected garbage.



[Figure 3] Current Paper System at the German University in Cairo

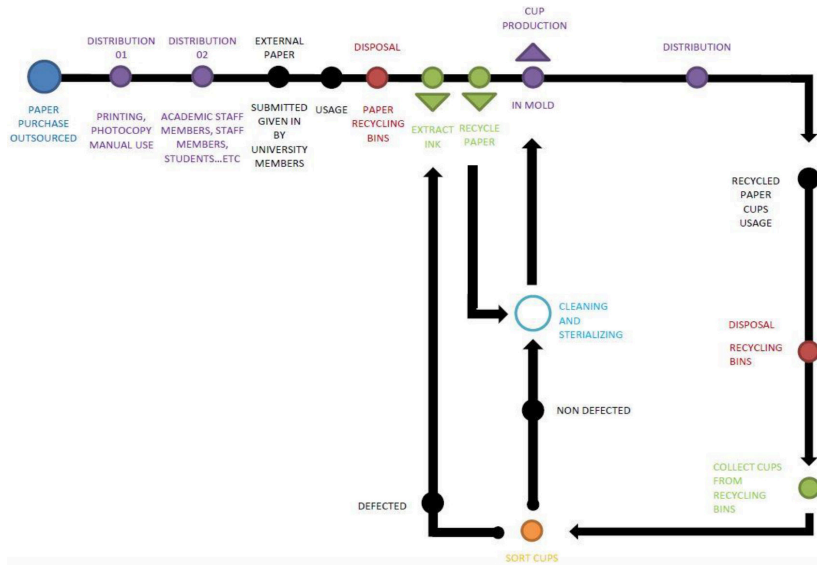
Paper does not only stop by the purchase of the university, it also comes from the students who submit their assignments and projects on campus. The campus becomes home to many paper from different areas. The waste of paper on campus is managed as follows: paper is purchased, then it goes to printing, photocopied or is manually used. Afterwards, it is distributed to different parties for use (academics, staff members, students, etc.). Paper is

disposed in big plastic bags in large quantities (for example, exam papers, assignment papers, projects). Used paper is removed by the house keeping department and transferred to a place where all paper is collected for sorting and stacking in order to be sold to paper traders.

**5. PROPOSED REGENERATIVE PACKAGING SYSTEM**

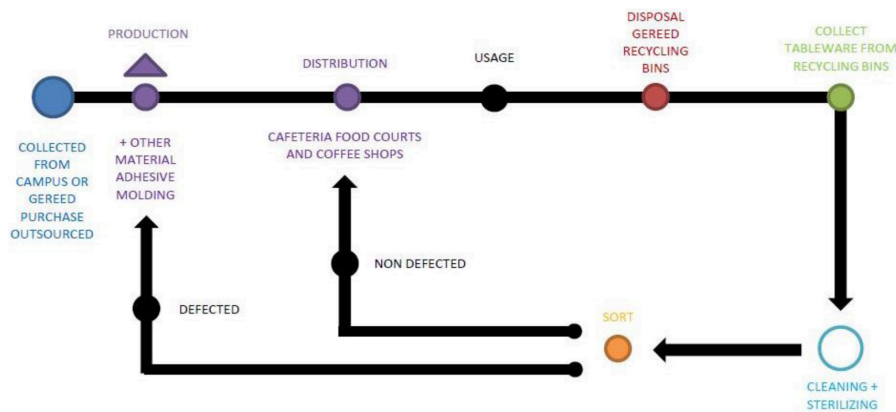
Based on our research findings, a proposed paper recycling system was developed (Figure 40 to create a regenerative system within campus paper consumption to achieve a minimum waste rate. In this system, the start is the same; paper is purchased in different quantities and printed on for different purposes. After usage, paper recycling bins are placed near every printer, office, copy centres and classroom. This will make collecting used paper waste easier for the house keeping department. Paper waste is then transferred to a spot where ink is extracted from the paper to be reused as writing ink. Paper will be shredded, recycled, and sterilized. After sterilizing, paper goes to production by pressing it into moulds to form the paper cups shape. Consequently, paper cups will be distributed to different places on campus like the cafeterias, and the coffee shops. After using the cups, they will be disposed in the cups recycling bins and the loop will continue again to go for sorting to two

different categories; the defected and non-defected cups. Defected cups go to recycling and moulding again, then to the cleaning station and sterilizing. However, the non-defected go directly to the cleaning and sterilizing station, then to be remoulded again.



[Figure 4] Regenerative Paper system for cup production at the university

Another system was developed for a long-term approach to incorporate reusable options for the university. For this approach, Gereed is used which is a material extracted from the leaves of Palm Trees and is renewed annually with approximately 965 tons are wasted every year in Egypt. The material is available in Egypt profusely as well as on campus where all exhaust leaves are thrown away with no use. The material can be made into boxes, planks, or curved and is a local renewable material (Eldeeb, 2017).



[Figure 5] Regenerative system for the development of reusable options made from Gereed

As shown Figure 5, the first step to produce the tableware is to collect Gereed from the university premises or outsource it externally. The material is grinded and an organic adhesive is added to hold the material together in the mould. The final products are then distributed to cafeterias, food courts and coffee shops where university members are to use the products as a replacement to plastic products. After usage, the tableware is disposed in specified bins

with clear signs for Gereed tableware. Tableware is collected by the housekeeping department from the specified bins. The tableware is transferred to be cleaned and sterilized and sorted to two different categories; non-defected and defected products. Non-defected products are directly transferred and distributed to the cafeterias, food courts and coffee shops. Defected products go back to reproduction, by grinding and moulding.

## 6. CONCLUSION

To conclude, an opportunity for enhancing the system of the university campus of the German University in Cairo was proposed by introducing a regenerative packaging system, by using both approaches, a recyclable products and reusable products. The systems address key elements of the existing processes to make use of every single part. They aim to reuse and regenerate different sources and materials already used on campus and introduced the reuse of the immense amount of wasted paper on campus to produce paper cups for everyday use on campus. Moreover, another regenerative system for reusable products using Gereed which comes from Palm tree leaves. Therefore, by following these systems the university will become more self-reliant and will reduce waste outcomes as well as be more cost efficient. The system targets student as trend setters to establish a new way of perceiving food and service in Egyptian culture. Once this environmentally friendly “trend” starts on campus other students and university members will also follow the trend.

## 7. FUTURE RECOMMENDATIONS

It is recommended that further testing be developed using the proposed systems to understand the behavioral acceptance of people towards applying these systems into their daily lives. It is also suggested that the systems and regenerative studies be applied in other universities across Egypt to further reduce and manage municipal waste. Further regenerative systems can be developed to incorporate other materials that are wasted on campuses and implementing the approach can be factored into the system of other workplaces in Egypt.

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