

**Auto Mechanism International Cleaning System
Project Management of Cleaning Panels Opportunity in the
Exterior Design Approach to Achieve Design Growth in the
Built Environment**

الآلية الميكانيكية لنظام التنظيف العالمي
فرصة إدارة مشروع تنظيف الألواح في نهج التصميم الخارجي لتحقيق النمو في
التصميم في البيئة المبنية

by

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of the requirements for the degree of
MSc PROJECT MANAGEMENT**

at

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DECLARATION

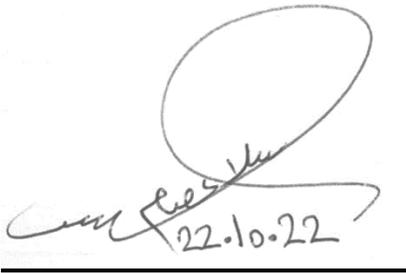
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ABSTRACT IN ENGLISH

Due to covid-19 pandemic and the extremely needs for a healthier environment, weather from the exterior elevations or from the interior materials, the auto mechanism cleaning system came to improve the sustainability through the cleaning system, to improve the lifestyle & the health of human-beings, and to increase the culture motivation between us in create an easier life, in addition to enhance the technological orientation as well as the sustainable orientation from worldwide, due to the move toward a technological sustainable environment.

Most of the researchers focused on studying solar panels and glass panels on the aspects of the natural atmosphere such as wind, rain, dust, and other natural weather conditions that we are exposed to in the life cycle of the globe, in addition to studying the amount of dust on these panels and the proportions of dust resulting from exposure of panels to rain and wind. And the resulting dust ratios, and then an example of a city located in Poland was mentioned, in which the dust ratios in solar panels were compared to window panels, and the extent to which the quality and efficiency of these panels was affected negatively or positively. This Dissertation presents a solution to the problem of quality and efficiency of panels in the presence of natural factors, in addition To the extent of storage capacity of solar energy rays and their estimated percentage, and to the methods of preserving the texture of glass panels and solar panels as materials, what materials will be used to enhance the project, the management method and the end result of the product , theoretically, scientifically, and commercially, because of what it enhances the methods of sustainability services in order to preserve human health , the environment and the technology for cultural stimulation that brings benefit to living organisms from humans, animals and plants.

The dissertation will be focusing on a problem to solve and to go in parallel with two directions, first direction the theoretical part and the second direction is the practical part, which will focus on a business scope of work, and from theoretical side will focus on the researchers' experiences, collecting the positive results in coordination with the negative results in order to improve the output methodology of the Auto-Mechanism Cleaning system. As well as changing the negative results of the researcher's results experiences and transfer it into a positive business case which will serve the human-beings as well as the human health and providing a cleaning methodology for the buildings.

Notice

With reference to the research below and the topic above, kindly note that there is no objection to the practical application to handle AMICS project in the solar panels and in the ordinary glass panel of the construction sites by specialists and bringing it to reality with the consent of its owner, considering the moral and financial returns that the project owner will gain, respect and motivation for her and for the stakeholders who are interested to be involved. Other stakeholders in a manner that serves human health in particular and the environment in general and in order to achieve sustainability and technology in a different administrative manner, and please take this research seriously to facilitate human life practically and in order to preserve human health in particular, and the environment in general, in addition to reducing the cost that is extracted monthly / yearly for cleaning purposes in residential and commercial buildings.

تنويه

إشارة إلى البحث أدناه والموضوع أعلاه، يرجى التكرم بالعلم أنه لا مانع من تطبيق الفكرة عملياً من قبل مختصين وجلبها للواقع بموافقة صاحبها على أن يتم الأخذ بمساعدته , وألا يتم غض النظر عن المردود المعنوي والمادي الذي قد يكتسبه صاحب المشروع , وذلك احتراماً وتحفيزاً له وللأطراف الأخرى من أصحاب المصلحة بما يخدم صحة الإنسان خاصة والبيئة عامة وحرصاً على تحقيق الاستدامة بطريقة إدارية مختلفة, ويرجى الأخذ بهذا البحث جدياً لتسهيل حياة الإنسان عملياً وحرصاً على الحفاظ على صحة الإنسان خاصة, والبيئة عامة بالإضافة إلى التقليل من التكلفة التي يتم استخراجها شهرياً/سنوياً لأغراض التنظيف في المباني السكنية والتجارية .

ABSTRACT IN ARABIC

بسبب كوفيد – 19 (كورونا فايروس) والحاجة القصوى لتحقيق بيئة صحية، ولدعم صحة الإنسان، سواء من ناحية الواجهات الخارجية أو من ناحية الجهات الداخلية لمشروع ما، تأتي آلية نظام ذاتي التنظيف لتحقيق الاستدامة عن طريق نظام ذاتي التنظيف، لتحسين نمط حياة الإنسان وصحة الإنسان، ولزيادة الحافز الثقافي بيننا، بالإضافة إلى تعزيز التوجه التكنولوجي والتوجه إلى الاستدامة، بسبب التوجه العالمي للاستدامة والتكنولوجيا، دون غرض النظر عن التوجه المادي الذي قد يؤول إليه المشروع.

ستركز الورقة على مشكلة يجب حلها والسير بالتوازي في اتجاهين، الاتجاه الأول هو الاتجاه النظري والاتجاه الثاني هو الاتجاه العملي، والذي سيركز في نهايته على نطاق عمل ورقة البحث بناءً على التطبيق التجاري، ومن الجانب النظري سيركز على تجارب الباحثين ووجهات نظرهم، وجمع النتائج الإيجابية بالتنسيق مع النتائج السلبية من أجل تحسين منهجية الإخراج لنظام التنظيف الآلي بنجاح وبما يخدم عالمنا. وكذلك تغيير النتائج السلبية لتجارب الباحثين وتحويلها إلى حالة عمل إيجابية تخدم صحة الإنسان وتحقق بيئة صحية، بالإضافة إلى بعض من التوصيات التي تعزز استخدام الاستدامة بطرق مختلفة تماشياً مع التغير المناخي وحياة الإنسان.

ركز معظم الباحثين في دراسة ألواح الطاقة الشمسية والألواح الزجاجية على نواحي الجو الطبيعي من رياح وأمطار وغيبار وما إلى ذلك من الأحوال الجوية الطبيعية التي نتعرض لها في دورة حياة الكرة الأرضية، بالإضافة إلى دراسة كمية الغبار على هذه الألواح ونسب الغبار الناتجة عن تعرض الألواح للأمطار والرياح وما ينتج عنها من نسب الغبار، وثم ذكر مثال لمدينة تقع في بولندا، تم فيها مقارنة نسب الغبار الواقعة على الألواح الشمسية ومقارنتها بنسب الغبار الواقع على ألواح النوافذ، ومدى تأثير جودة وكفاءة هذه الألواح سلباً أو إيجاباً، تطرح هذه الورقة حلاً لمشكلة الجودة وكفاءة الألواح بوجود عوامل الطبيعة، بالإضافة إلى مدى قابلية تخزين أشعة الطاقة الشمسية ونسبتها تقديرياً، بالإضافة إلى طرق الحفاظ على قوام الألواح الزجاجية وألواح الطاقة الشمسية كمواد، وماهية المواد التي سيتم استخدامها لتعزيز المشروع، نظرياً، علمياً، و تجارياً (عملياً)، وذلك لما فيه من تعزيز لطرق خدمات الاستدامة حفاظاً على صحة الإنسان و البيئة بالإضافة إلى التكنولوجيا للتحفيز الثقافي الذي يحقق منفعة للكائنات الحية من إنسان، حيوان ونبات.

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CHAPTER 1. INTRODUCTION

1.1 Renewable Energy

Preventing energy crises is one of the most important issues of the twenty-first century. In the past, people struggled to find alternative ways to meet the growing energy needs of the world's population, the vast majority of whom still live in poverty to electricity, without robbing future generations of needed resources, polluting our ecosystems, and placing a premium. On the world's energy abundant regions are exerting undue pressure. The first problem in achieving this goal is the increase in demand due to rapid population growth and efforts to develop the economy in the most densely populated areas of the world. In just one generation, the world's population has grown by nearly 2 billion, with developing countries making a significant contribution. Moreover, it is known that the growth rate of energy demand is directly proportional to economic growth. Based on this, the International Energy Agency (IEA) estimates that developing countries will need to double their installed capacity by 2020 to meet the growing demand for electricity. In the 2009 International Energy Outlook (IEO) (Outlook, 2010), from 2006 to 2030, total energy consumption in the world market is expected to increase by 44%. Despite multiple initiatives, policies and investments to increase power generation capacity, the number of unelectrified areas in developing countries has not changed much. Lack of access to electricity remains one of the main reasons why citizens in societies do not have electricity (Al-Khatib, 1993). Therefore, it is critical to create the required infrastructure and install the distributed energy resources required to meet the energy requirements of the site. Renewable energy is not a new concept, but it continues to rapidly transform into an alternative to fossil fuels and other harmful energy sources. The potential of renewables is enormous, as they can theoretically generate many times the world's total energy needs. For example, some studies suggest that global energy demand can be met about 1,000 times by using solar energy; However, only 0.02% of this energy is currently used (Xia & Xia, 2010). Renewable energy sources such as biomass, wind, solar, hydro, and geothermal can provide sustainable energy services based on the use of different resources. The possibility of switching to renewable energy systems increases as their costs continue to decline while the cost of fossil fuels continues to rise. The performance characteristics of solar and wind power generation systems have continued to improve and have experienced rapid sales growth over the past 30 years. The capital

and power generation costs associated with these systems have also been significantly reduced (Herzog, Lipman, Kammen, Systems & Development, 2001).

As a result of these developments, there are many opportunities to innovate and take advantage of emerging markets to promote renewable energy technologies, particularly with additional assistance from governments in line with the requirements of the environmental changes that humanity is undergoing. The development and use of renewable energy can enhance the diversity of energy supply markets, help ensure sustainable energy supplies over the long term, help reduce domestic and global atmospheric emissions, and provide commercially attractive options for meeting specific energy service needs and efficiency. The use of renewable energy in its various ways is becoming increasingly important to mitigate the effects of climate change. Solar energy technology is a very promising renewable resource, due to increased production efficiency and the ability to use it in a variety of locations. The inherent qualities of solar energy make it a beneficial benefit, especially for developing countries, for a number of reasons: First, most developing countries are located in areas where sunlight is easily accessible. For example, India receives about 5,000 trillion kilowatt-hours of solar energy annually. Moreover, the average radiation in the tropics and subtropics located in developing countries is comparable to the global annual radiation of about 1600-2200 Kw/m² (Najfi et al., 2015). Second, most of the available fossil fuel and energy resources can only be used through the development of ecosystems, which leads to social decline. Third, increasing global independence from fossil fuels has accelerated the demand for solar energy technologies, increasing the amount of research required, and thus reducing associated costs. Fourth, solar energy systems are relatively inexpensive and suitable for homes and villages, as homes in industrialized countries use more solar energy than ever before. Finally, in solar technology, passive solar design excels when considering renewable energy sources for a building and can be combined with solar panels to maximize comfort and sustainability (Visa, Moldovan, Comsit, Duta, and Buildings, 2014).

1.2 Solar Technologies

Solar energy can be converted into electricity using different technologies, such as photovoltaic (PV) panels, concentrated solar heat (CSP), and concentrated photovoltaic (CVT) cells (Pratap, Singh, Sharma, Rani, & Review, 2014). It enhances the efficiency of solar panels and ordinary glass panels on construction sites.

1.3 Solar Photovoltaics

A solar photovoltaic module is a solid-state semiconductor device that converts sunlight into direct current. Materials used on photovoltaic panels are monocrystalline silicon, polycrystalline silicon, microcrystalline silicon, copper indium selenide, and cadmium telluride (Razykov et al., 2011). PV production has doubled every 2 years and has grown by an average of 48% per year since 2002, making it the fastest growing energy technology in the world (Kropp, 2009). Currently about 90% of photovoltaic capacity consists of grid-connected power systems. Such installations can be ground-mounted (sometimes combined with farming and grazing) or built on the roof or walls of buildings and are called building-integrated photovoltaics (BIPV). Modern solar PV plants have capacities ranging from 10 to 60 MW, although proposed solar PV plants will have a capacity of 150 MW or more (Kropp, 2009). Net metering and financial incentives such as preferential feed-in tariffs for solar power have supported solar PV installations in many countries. A typical PV panel can now operate at 90% of its rated power capacity for up to 10 years and at 80% of its rated power capacity for up to 25 years. The total U.S. solar nameplate installed capacity and electricity generation. Photovoltaic technology has been manufactured by many companies, including capital equipment manufacturers, cell manufacturers, panel manufacturers and installers (Swanson, 2009) . The list does not include silicon manufacturing companies. According to an annual market survey by photovoltaic industry publication Photon International, global photovoltaic cell and module production was 12.3 GW in 2009, with the top 10 manufacturers accounting for 45% of the total (Hirshman, 2010). Leading PV manufacturers include First Solar, Suntech Power, Sharp, Q-Cells, Yingly Green Energy, JA Solar, Kyosera, Trina Solar, SunPower and Gintech (Razykov et al., 2011). Brief descriptions of some of these manufacturers include: Suntech – Suntech Power Holdings Ltd. Is the world’s largest producer of crystalline silicon

photovoltaic modules. As the center of the company's global operations, Suntech's headquarters in Wuxi, China, houses the world's largest building-integrated solar curtain wall. Suntech Power is the world's largest producer of solar panels, with an annual capacity of 1,800 megawatts as of the end of 2010. Total solar photovoltaic cell shipments in 2010 were 1572 MW (Devabhaktuni et al., 2013).

JA Solar Holdings – A Solar Holdings: JA Solar Holdings designs and manufactures monocrystalline solar cells primarily in the People's Republic of China. JA Solar Holdings also sells its products to customers in Germany, Sweden, Spain, South Korea and the United States. Total solar photovoltaic cell shipments in 2010 were 1464 MW (Ruiter, 2012).

First Solar—First Solar, Inc. is a publicly traded U.S. energy company in the solar energy sector. It manufactures PV solar modules using a cadmium telluride (CdTe) based thin film semiconductor process to produce PV modules. Total solar PV cell shipments in 2010 were 1411 MW (Allamraju & Srikanth).

Yingli – Yingli, also known as Yingli Green Energy Holdings Limited, is a solar energy company and one of the largest vertically integrated photovoltaic solar module manufacturers. Total solar photovoltaic cell shipments in 2010 were 1062 MW (Wang & reviews, 2010).

1.4 Concentrating Solar Photovoltaic Systems

Due to the shape of photovoltaic panels and the varying sun intensity throughout the day, photovoltaic panels are sometimes not able to efficiently capture all of the available energy from sunlight. Another way to efficiently capture maximum solar energy is to use a CSP system. CSP systems use lenses or mirrors to focus sunlight concentrated in a large area into a small area to generate electricity. Solar concentrators are mounted on solar trackers to track the position of the sun. As long as the temperature is at the sweet spot of the cell junction, the solar cell will operate at high efficiency. If these systems are installed in large-scale solar power plants, they can be used to ensure that the utilized energy is converted into heat more efficiently. The parabolic trough solar thermal system is the only commercially available CSP system. These systems use parabolic trough mirrors to focus sunlight onto highly efficient heat-receiving tubes containing heat-transfer fluids. This fluid is heated to approximately 390 1C (734 1F) and pumped through a series of heat

exchangers to generate superheated steam that powers a conventional turbine generator to generate electricity (Ahmadi et al., 2018). More recently, power tower and dish/engine-type CSP systems have been developed. A power tower consists of a set of relatively small flat glass mirrors placed around a receiver (solar boiler) that convert the received light into useful heat. These mirrors reflect sunlight onto the collecting surface of the solar boiler located at the top of the tower. Concentrated sunlight focused on the collection surface is used to directly generate steam, which then drives a turbine/generator to generate electricity. Some power tower receivers use molten salt as a heat transfer medium to generate steam through a heat exchanger such as a parabolic trough. Dish–Stirling is a 25-Kw solar power system designed to automatically track the sun and focus solar heat onto a power conversion unit (PCU). This, in turn, converts intense heat into grid-quality electricity. The concentrator consists of a 38-foot diameter dish that supports 82 curved glass mirrors, each measuring 3 feet by 4 feet. These mirrors concentrate solar energy onto the heater head of a high-efficiency, four-cylinder, reciprocating Stirling-cycle engine, and each system can generate up to 25 Kw of electricity. However, these systems are currently under development and therefore cannot be used commercially. Aside from efficiency, the main advantage of using CSPs is that these techniques involve thermal intermediaries, so can be easily blended with fossil fuels, and in some cases are suitable for utilizing thermal storage (Devabhaktuni et al., 2013).

1.5 Flat Plate & Evacuated Tube Solar Collectors

In contrast to CSP systems, flat plate or evacuated tube solar collectors can be used to collect solar energy in a decentralized manner for both heating and cooling purposes (Otanicar, Taylor, & Phelan, 2012). Due to its high efficiency and cost-effective nature, this technology has become very popular worldwide and can be used year-round, even under high humidity, low temperature and/or generally harsh weather conditions (Mahjouri, 2004). Partly because they improve the efficiency of electric water heaters (Arefin, Hasan, & Azad, 2011), as of 2010, more than 70 million households worldwide have actively installed this technology (Langniss & Ince, 2004). The basic structures of these systems include some type of absorption mechanism, some type of transfer mechanism, and some type of storage (Devabhaktuni et al., 2013). The absorption mechanism is usually some type of copper tubes in various configurations

that are coated to improve efficiency (Mendes, Horta, Carvalho, & Silva, 2008). Various piping configurations may include harp, serpentine, fully submerged, or boundary layer (Devabhaktuni et al., 2013). Water or air is circulated through this piping system, where it is heated and returned to storage. A more efficient improvement on this technology is the vacuum tube collector. In this configuration, the heat pipe is vacuum sealed into a containment cell. These pipes are then used to transfer heat using manifolds. Evacuated tube construction is often preferred because it is 20-45% more efficient than flat-panel solar collectors, reduces heat loss by mitigating conduction/convective forces through vacuum sealing, uses inexpensive tubes that are durable and inexpensive to replace, and is less expensive due to the cylindrical shape of the tubes shape characteristics, passively track the sun, thereby increasing efficiency at lower cost (Mangal, Lamba, Gupta, & Jhamb, 2010).

1.6 Project Management Link Sustainability & Technology in Projects

Sustainability, technology, and the management between them is the positive coordination between humankind's aspirations for a better life on hand, and the constraints imposed by nature on the other hand. It is implemented through three aspects, the social aspect, economic aspect, and environmental aspects as one direction, as there is nothing called weak sustainability and strong sustainability, and the results of both focus on achieving prosperity to future generations. (Kuhlman, T.; Farrington, J.2010). Technology is a word of Greek origin, consisting of two syllables, namely: "techno", which means art, craft, or performance, and the second syllable is "logia", meaning study, or science. Or the implementation of things. (Mohammed juwarneh. Raghad, k. 2021). The study of sensor technology faces numerous ambiguities in terms of definitions and terminology. The field of endeavor is incredibly broad, involving virtually every scientific and technical discipline. Therefore, it should not be surprising that there is ambiguity in the field. (Robert schafrik, 1995). Timer, an approach to timing where the clock is automatically activated by the starting device and the end time is automatically recorded with a duration specified, or manually timed to the desired duration <https://www.ledkia.com/blog/uk/uses-of-an-electrical-timer> Project management is the use of specific knowledge, skills, tools, and techniques to deliver something of value to people. The development of software for an improved business process, the

construction of a building, the relief effort after a natural disaster, the expansion of sales into a new geographic market. PMI consider as the world's leading authority on project management, PMI empowers people to make ideas a reality. Through global advocacy, networking, collaboration, research, and education, PMI prepares organizations and individuals to work smarter in an ever-changing and dynamic world. (PMI institute).

1.7 Research Background

Most of the researchers focused on studying solar panels and glass panels on the aspects of the natural atmosphere such as wind, rain, dust, and other natural weather conditions that we are exposed to in the life cycle of the globe, in addition to studying the amount of dust on these panels and the proportions of dust resulting from exposure of panels to rain and wind. And the resulting dust ratios, and then an example of a city located in Poland was mentioned, in which the dust ratios in solar panels were compared and compared to window panels, and the extent to which the quality and efficiency of these panels were affected negatively or positively. The dissertation presents a solution to the problem of quality and efficiency of panels in the presence of natural factors, in addition To the extent of storage capacity of solar energy rays and their estimated percentage, in addition to the methods of preserving the texture of glass panels and solar panels as materials, and what materials will be used to enhance the project, theoretically, scientifically, and commercially, because of what it enhances the methods of sustainability services in order to preserve human health , the environment in addition to technology for cultural stimulation that brings benefit to living organisms from humans, animals and plants . (Ahmadi, M. H., Ghazvini, M & others. (2018).

Researchers notices on their result's duo the dust results from rain are higher than the dust percentage that results from the wind, also the power of the wind itself it causes either a higher percentage of dust or a lower percentage of dust, in which the stronger wind led to less dust and the lower strength of wind the more dust will group in the solar panels and the ordinary glass panels. As for the rain, the more rain will fall down into the panels the more dust will be grouped on that panels after it dry, while the less rain means less dust on the panel surface.

In all cases, the results of grouping a dust in a panels surface , for the term of solar panels or photovoltaic panels the efficiency of the surfaces will be reduces as well as the saving of sun

energy heat power will be reduced and that will case a short term life of the photovoltaic panels as well as the users will not use these panels for a long term period, on the other hand in the condition of the ordinary glass, it will lose its strength's which might cause a dangerous result's for us, such as the efficiency of the material quality will be reduced which might cause a glass breaking down through years (By researcher)

In the following topics the dissertation will study the topic in detail in order to provide a clear historical line and provide the methods to enhance the existing studies by the researcher's and to provide recommendations in which we can work on it with providing an idea that can come to reality to add a value to people life.

1.8 Organizational Changes

Organizations change continuously , and we humans tend to the continuous change that is caused by the success of this change, and at the same time the fear of change is still present among many people, because it is attached to many expectations and doubts related to each other, and this makes many people in many Sometimes to go to the adoption of prior experiences, as there is no doubt that this matter requires a lot of effort, energy, focus and money. In our present, change organizations have become more flexible, and the test of change organizations is no longer as frightening as it was in the past, due to the availability of many possibilities in our present society that facilitate methods of change in various fields.

<https://online.hbs.edu/blog/post/organizational-change-management>

The stages of development and change in organizations were limited to change in many industries, starting with the agricultural era and then the era of innovations and inventions to the present time with the trend towards sustainability, especially after the high population in the world and the challenges we face at various levels, the system of change must be accepted and that By raising the level of positive expectations, reducing doubts, investing funds in guarantee , and heading towards finding sustainable solutions to these challenges. The stages of change include changing the organization and changing individuals, as individuals are a primary reason for changing the organization, and it is not necessary that changing the organization be a planned goal,

but it can be considered decisions that are made based on what we face in our present world of changes produced by nature, such as the changes brought about by the existence of us Corona is a virus caused by a bat, as it was important to automatically and positively adapt to the situations and things that have happened due to the presence of the virus, such as changing the movement of people and making it more regular and moving away from randomness that often led to an increase in the number of patients and raising the focus on the health field in all its levels, raising the level of purification to higher proportions than it was previously . Intermittent always means redirection and it has no final limit and is characterized by ambiguity because it has no end. It also works to redirect based on events and strategic decisions are taken in this regard based on changes in the environment. With regard to expectations, it is preferable in this case to tend to positive expectations that help to Creating a better reality for society. Creating organizational components that contain a beginning and an end that help find and fix loopholes in the event that the loopholes are negative, or stimulate them in the event that, they are positive. And the cooperation of the senior management and its positive focus on building society without tending to the personal interest or the interest of one of the parties and concern for the public interest that enhances cooperation between individuals without exception, promoting change by creating new services concerned with the employment of the workforce. Reorientation, principally in the material stimulation of the materialistic tendencies and materialistic tendencies that people in various industries focus on at present - and this may be overlooked in some subjects if the building of positive and equitable cooperation in the sharing of proportions depends on the goodwill of the two parties and the cooperation Continuity between them in order to strengthen the relations between the two parties. The opening of factories is one of the basic things that help build society and peoples, and enhance and facilitate the nature of life, in addition to the profitability that society gains from all classes, avoiding selfishness and personal interest that is based on lack of interest and taking without giving, avoiding covering the facts for what harms many people Acting with credibility, honesty, respect for the law, Training in the knowledge and practice of law.

<https://online.hbs.edu/blog/post/organizational-change-management>

The gradual change concerned with future expectations, I find it necessary to include them in the event that the expectations are positive and concerned with the renaissance of societies, but in the case of negative expectations, they are not considered so as not to negatively affect any of

the members of society, as it focuses on continuous cooperation such as continuous cooperation on Providing services to clients in a real estate company.

<https://online.hbs.edu/blog/post/organizational-change-management>

For the success of the change initiative, it is necessary to address the guidance in restructuring and mentality in the interest of all parties by focusing on the public interest and positive prediction during the change phase and full awareness of the stages of change starting with planning and profitable conclusion to successful final implementation. To determine the goal of change, it is necessary to set a goal for the success of change and to work with the causes, which are among the basics of the success of change in organizations of all kinds, in addition to the need not to confuse things. Such as classifying the work environment as a work environment and separating personal life from practical life to avoid the existence of injustice, and follow-up of justice without verbal manipulation of words that do justice to the parties because the parties close to the personality may tend to differ and conflict at times, so the presence of practical minds in the work environment establishes justice fairness and act upon it.

<https://online.hbs.edu/blog/post/organizational-change-management>

1.8.1 Basic Steps for Designing & Implementing Successful Change

Change in institutions has become one of the main important factors, whether in government institutions or private institutions and even semi-governmental institutions, especially after the spread of diseases such as Covid 19 and beyond. It is necessary to focus on providing jobs in various areas of sustainability and providing fewer work steps, especially in the external environment (Outside the body) <https://whatfix.com/blog/types-of-organizational-change/>

The following are the steps for successful change management

- Creating a detailed common vision that is in the interest of individuals.
- Positively managing the change process, while ensuring that the implementation steps are managed positively and appropriately and ensuring peace and safety.

- That the relationships between planners and implementers be limited to ethical action.
- To build strong effective relationships between technicians and administrators with impartiality and tendencies to the truth.
- The application is phased and parallel.
- Training and encouragement of innovative ideas.
- Maintaining the continuity of change efforts and supporting results while maintaining the psychology of employees, technicians, and administrators for the continuity of profitable production.
- Motivation, reward, and non-exploitation by flipping facts
- Keep everyone in the organization updated step by step in the changing process to rise up with the company and to listen to more visions during any updates, new steps, new techniques, and new ideas.
- The need for simplifying and a clear path in each process, and a well-known in rules to avoid drop down that cause by lack in knowledge.
- In keep everyone updated should be followed by focus – to avoid the individual change
- In make everyone in organization updated in every step – will detect the words that is done by some managers (such as organization policy) because in this case it's not about policies as much as its about to rise up with the organization, policy will be mainly in respect the organization rules and the change in rules of each organization individually.

1.9 Historical Brief about Project Management

Due to the rise in using solar panels and photovoltaics, the daily performances for the purpose of improvement makes us use the concept behind any idea in the circle of sustainability to find the right way to function the concept practically, to serve the human needs and lifestyle, There is no clear definition of project management because of its diversity among individuals and different theories, and it must be asserted that we are still trying to understand and make project

management theory a success, and the effectiveness of project management still raises many questions because it contains many contradictions. The study of project management by universities represents a unified organizational structure for the success Project management The electronic intervention came as a support for the success of the project management process in the bodies, especially the educational one. The dissertation focuses on the successful of the project management versus exposing inherent contradictions. (Pasian, M. B. Ed. 2015).

Project management is defined as a set of interrelated activities that are being worked on to achieve the services and results to be accessed and economically attached. (Kinlaw, D. C., & Eads, J. 1992). Taylor advocated the necessity of developing a control methodology that is based on the principle of science, harmony, and cooperation to reach the highest level of efficiency (Taylor, L. R. 1913). The researcher discusses the importance of organizational maturity and new models of maturity and sustainable development, beneficial to project maturity. And the need for organizational performance to be linked to project management in terms of transparency of inputs and outputs based on OPM3 standards in which it depends on thinking strategy and improve it through individuals, operations, and technology (Hulya, J. 2018) (Miller, B. 2004).

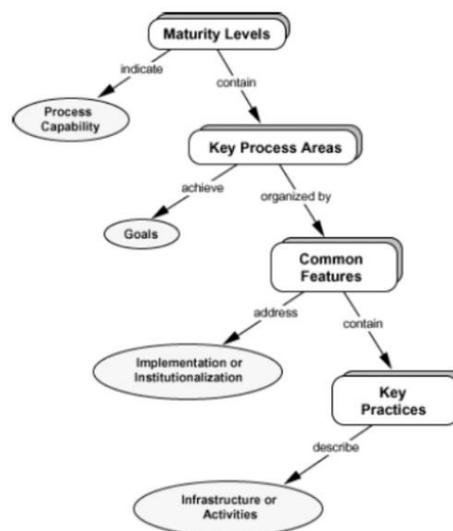


Figure 1. CMM-SW Model, SEISM Miller, B. (2004)

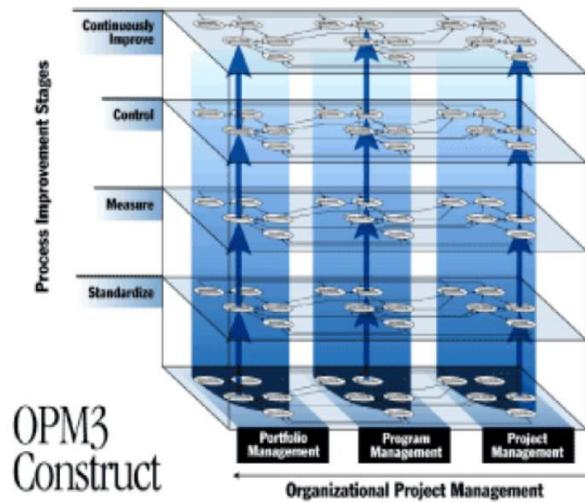


Figure 2. OPM3™ (PMI, 2003 p.28)

CMM-SW Model, SEISM: An organization was assessed as possessing a maturity level set at its lowest level of assessed capability OPM3™ org. development project management.: Where OPM3™ depends on the principle of Deming as this principle depends on the continuous development of the project. (Schlichter, J. 2003).

Summarize the history of project management through what was built in the past, which in turn illustrates the way of human thinking in past eras by setting examples such as the Great Wall of China and the Pyramids of Giza, which in turn gave an illustrative picture of the past of project management before it was turned from practical into an educational principal (Seymour, T., & Hussein, S. (2014).

1.10 Definition of Sustainability

Sustainability is a word that is based on many activities that humans have the duty to carry out to maintain the natural standard of living on planet Earth, which are diverse and productive biological systems over time, and due to the high population of the earth, the ecosystem began to decline, so it is necessary to rely on Sustainability system, and on collective cooperation, as a basic solution to preserve the globe, as sustainability helps to arrange the living situation of the

population, whether in suburbs or cities through coordinate between the individual needs, economic sector, and environmental needs. (Portnoy, K. E.2015).

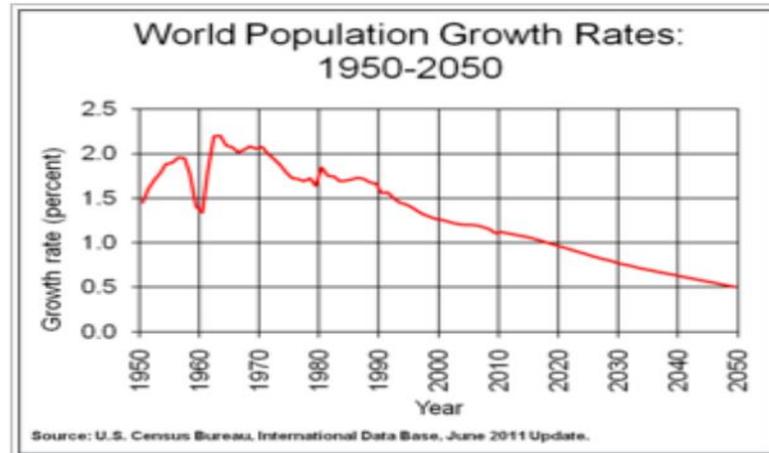


Figure 3. World population growth (Census, B. 2011)

1.11 Historical Brief about Sustainability

Because of the high requirements of the individuals, especially since 2005, man has resorted to sustainable systems, to preserve our planet from the rise of environmental problems, sustainability methods such as recycling plastic, using water energy to generate electricity, recycling clean water used by humans, in addition to sustainable agriculture, overtime technology has become an essential factor in preserving the environment, by integrating it with sustainability. Energy is not only derived from sunlight, but also from wind, tides, waves, and heat in the earth's interior. As for solar energy, it is in two ways, first by absorbing the globe of energy, which leads to global warming, and therefore using it as energy to generate electricity and other sustainable processes, and the second way by adopting architectural methods such as recycling and reuse processes, and cooling processes, which dispense with the use of electricity in abundance, through building materials and dyes, which cool the interior spaces. (Mohamed, S. P & Others. 2019).

There is a different performance for the solar panels, and we can't make a project without measuring it, wither from financial aspects, environmental aspects, human needs aspects, legally, and even between investors. having an assets manager or a risk manager it's never an issue because

they both open a new vision, but controlling the issue it's always the matter in each aspect (Martin & Jason, K. 2017)

As for solar energy, which in turn is divided into two parts, passive solar energy, which is concerned with setting up cooling, heating, and lighting mechanisms using solar energy by architects, to provide sunlight and warmth in the spaces, provided that the temperature is not high inside those spaces. (Mohamed, S. P & Others. 2019).

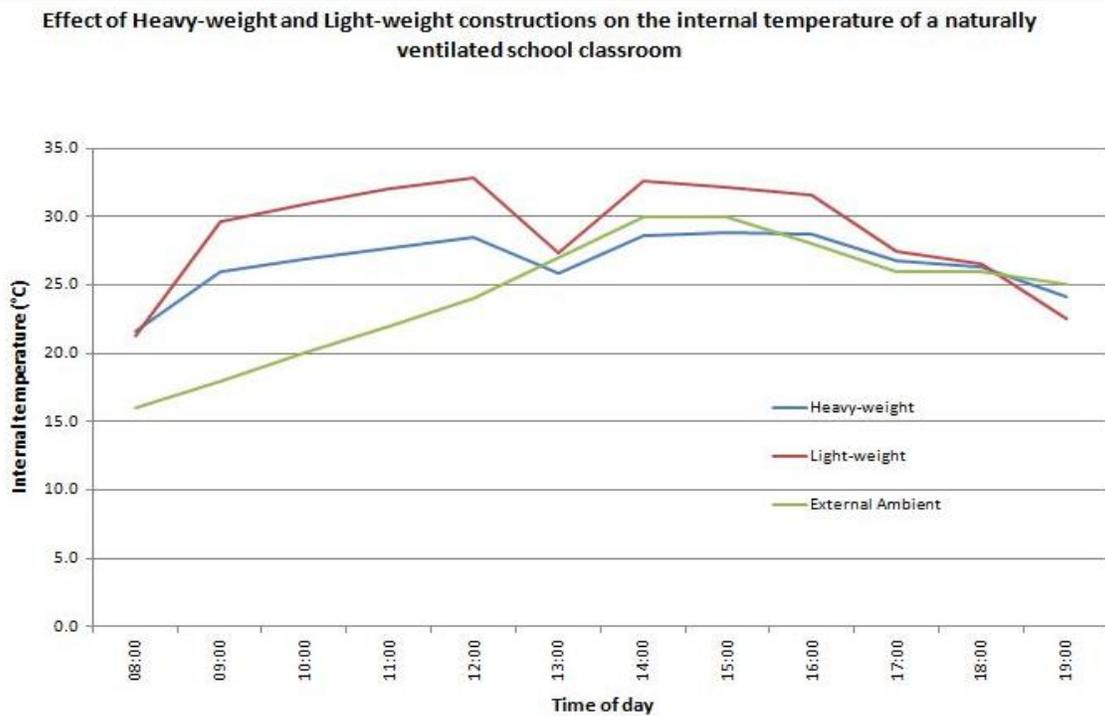


Figure 4. Thermal mass phenomenon of a classroom (Pahazzard. 2013)

The graph shows that the red line is the light construction weight, and the blue line shows the heavy construction weight, both lines temperature starts from 22c at 8 morning which means the temperature start to increase at 8 mornings, it also means in the early morning before 8am the weather is either cold or cool moisture air, and both lines are increased to reach the highest degree at 12pm , and start to decrease again between 12:01 and 1:00 pm to increase again from 1:01 to 2:30pm after that the evening time start from 2:31pm till 7:00 pm , at 9 am the temperature is

almost 26 c in heavy weight construction and almost 29 c in light weight construction , has a high internal temperature lines which translate the high internal temperature in the classroom before rotating/adding a mass in order to reduce the temperature of the classroom, the blue and red lines both looks are going in parallel but the temperature in light weight construction is higher probably because of the lightness of the used material of the building construction , or an unwell fixing of materials also it might be a summer and autumn season, while in heavy weight the temperature is less because of the material thicknesses, the season of winter and spring as well as the well fixing of materiality, the entrance of the external ambient (machine/sensor)it could be in a shape of shading (trees) which help in reducing the entrance of high temperature, or adding a mass in the front in order to store the heating in that mass and reduce it in the rest areas. as the graph show the ambient temperature helps to determine the heat of the classroom in order to determine the right place for the furniture (locate) also determine the right place for the windows (glass details). The highest temperature degree in the present of ambient temperature is stable between 2pm and 3pm.

1.12 Historical Brief about Sustainable Management



Figure 5. Relationship between sustainability & project management. Marcelino-Sádaba, S., & others (2015).

Researchers, in addition to companies in general, find it necessary to follow the methods of sustainability, and sustainability management, because of the approach that is based on the principle of sustainability that every problem has a solution, and that solving of each problem is different, and requires its own approach, because the principle of sustainability is not a routine field, and to achieve ways Sustainability with its different types must be integrated with administrative competencies in order to achieve different sustainability approaches in terms of guidance, analysis, experimental implementation, and results. One of the most important ways to achieve sustainability lies in the diversity of disciplines and personal competence in addition to work efficiency and embracing diversity, and these methods are the most relevant to achieving it, Achieving sustainability management lies in achieving a balance between the parties, socially, economically and environmentally, and it is not related to what has been achieved in the past, as the backgrounds of sustainability are different because they are placed in different frameworks, and this explains the importance of achieving individual competence and his ability to meet the various challenges of sustainability theory, And stay away from confined to the framework of the routine. (Wesselink, R., & others 2015). Successful of sustainable management (Mulder, P., & Van Den Bergh, J. C. (2001).

1.12.1 Method's to a Successful to Sustainability Management

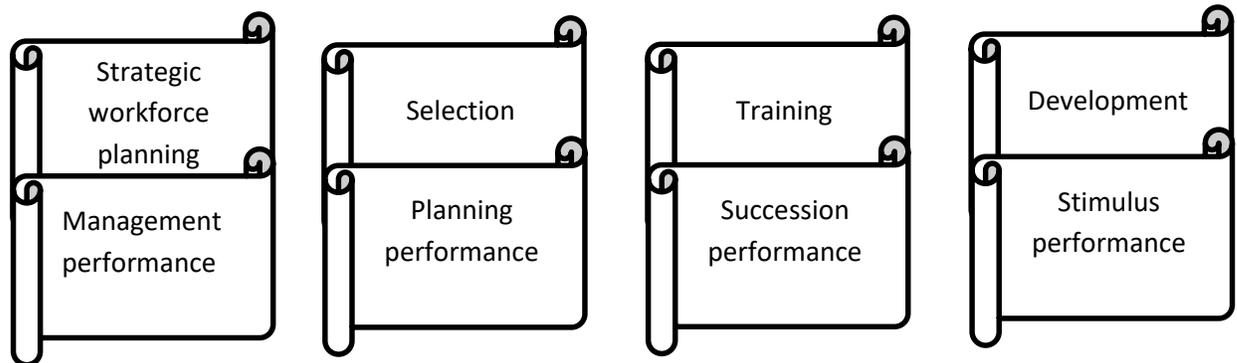


Figure 6. Successful of sustainable management (Mulder, p., & Van Den Bergh, J.C. (2001).

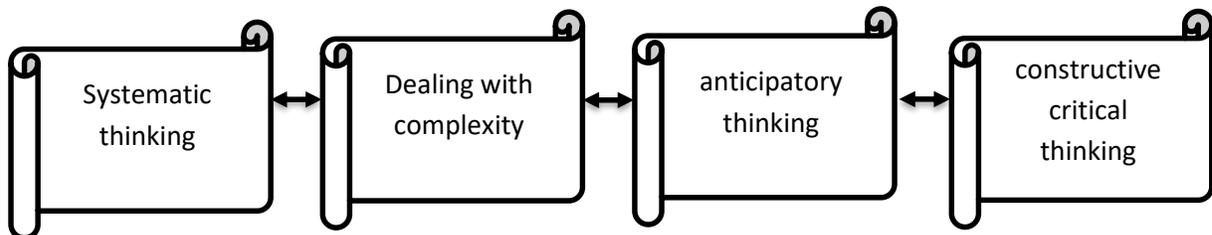


Figure 7. Success to experimental method in sustainability management (Mulder, p., & Van Den Bergh, J.C. (2001).

To achieve sustainability in projects, administrative sustainability must be achieved, and one of the most important ways to achieve this is by avoiding misunderstanding and not prolonging discussions about matters that are believed to be correct, by avoiding camouflage between the parties about what is true, for a sustainable improvement of ideas, might be better than what is required. (Mulder, P., & Van Den Bergh, J. C. (2001).

1.13 Historical Brief About MEM'S Sensor System

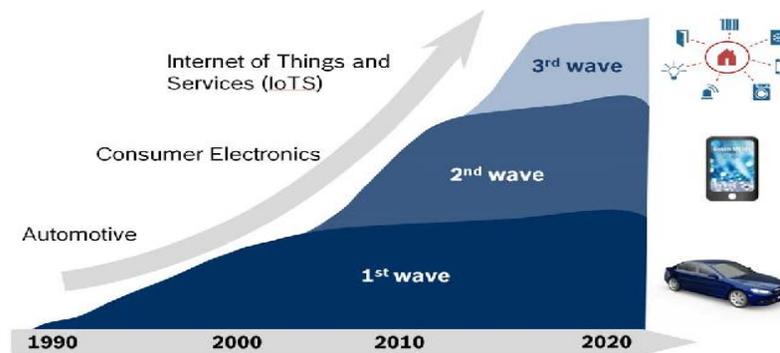


Figure 8. The three waves of Mems sensors (Lammel, G. 2015)

The Microelectromechanical Systems market has grown faster than the semiconductor industry average. During that time, the biggest technical driver of MEMS has changed from automotive applications to consumer electronics dominated by smartphones. MEMS sensors have also become the heart of entire classes of electronic devices. (Lammel, G. 2015).

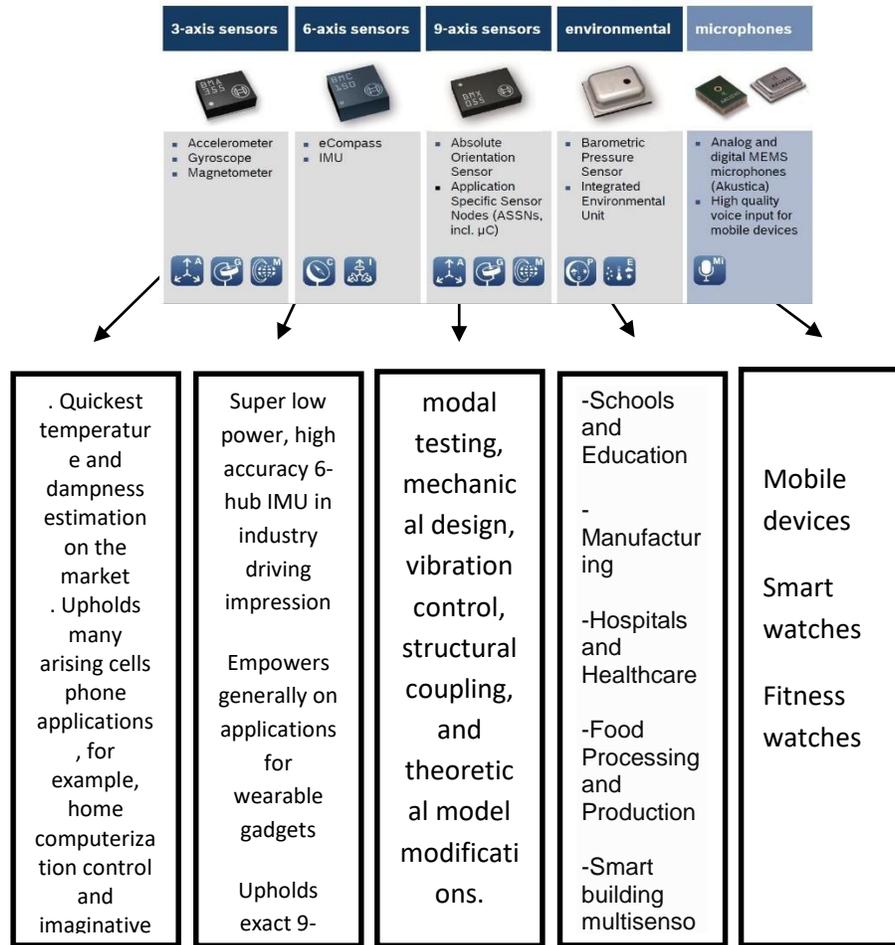


Figure 9. Axis to MEM'S sensor's, mems sensors and solutions (Lammel, G. 2015).

Based on the examples that is linked to each sensor system, the suitable type of sensor that need to be used in order to support the Auto-mechanism self-cleaning system is either the 9-axis sensors or environmental sensor, as there is no guarantee of the ability to make a coordination between environmental sensor and 9-axis sensor, this thing can be determined by specialists.

1.14 Problem Statement

The power generation of photovoltaic (PV) plants is significantly affected by the cleanliness of the PV modules. Dust is the main source of pollution. Natural dust deposition is affected by human activities and meteorological factors such as temperature, humidity, wind speed, and PM10

concentration in the installation area of photovoltaic modules (Kazem & Chaichan, 2019). According to Chen et al. (2020) Research efforts to date have focused on predicting photovoltaic power generation, however, in practice, photovoltaic power generation may deviate significantly from the predicted value due to dust pollution, which, unfortunately, has not been fully investigated. To the best of the authors' knowledge. The study found that the dust accumulated on the surface of photovoltaic modules easily forms clusters under the influence of rainfall, which is one of the main reasons for the rapid decline of photovoltaic output. Analysis showed that the dust deposits were mainly composed of SiO₂ and CaCO₃. Further analysis shows that in East China, the average dust concentration of photovoltaic modules in one week is 0.644 g/m², so dust reduces photovoltaic output power by 7.4% for one week (Chen et al., 2020).

Research related to dust accumulation is crucial, as further reductions in (real) system efficiency would make PV systems an unattractive alternative energy source, especially for the larger domestic market (Zaihidee, Mekhilef, Seyedmahmoudian, Horan, & Reviews, 2016). Given that dust deposition is a complex phenomenon and is affected by site-specific environmental and weather conditions, current research on characterizing dust deposition and its impact on photovoltaic system performance is limited. Dust is a term that generally applies to tiny solid particles less than 500 µm in diameter. It arises from various sources in the atmosphere, such as dust lifted by the wind, the movement of pedestrians and vehicles, volcanic eruptions, and pollution. In this context, dust also refers to the microscopic pollen (fungi, bacteria, and plants) and microfibers (from fabrics such as clothing, carpets, linen, etc.) that are ubiquitous and readily disperse in the atmosphere and thus settle as dust (Mani, Pillai, & reviews, 2010).

Hence, the Dissertation presents a solution to the problem of the quality and efficiency of the panels in the presence of natural factors, in addition to the extent of the storage capacity of solar energy and its estimated percentage, and the methods of preserving the glass fabric of buildings of different heights, panels and solar panels as materials, and what materials will be used to enhance the project, and the method Management and the end result of the product, theoretically, scientifically and commercially, to enhance the methods of sustainability services in order to preserve the human being. Health, environment, and cultural stimulation technology that benefit living beings of humans, animals, and plants.

Therefore, the aim of the study is to focus on a solution which can go in parallel into two directions, the first direction is the theoretical part and the second direction is the practical part, which will focus on the scope of commercial work, and the theoretical side focuses on the researchers' experiences and collecting positive results in coordination with negative results to improve the methodology. The outputs of the automated cleaning system and changing the negative results of the researcher's experiments and transforming them into positive results. A preliminary feasibility study that serves human and human health and provides a cleaning methodology for buildings. On the other hand, based on a research approach that combines literature review and case study, this work is based on identifying advanced project management concepts and practices to contribute to effective code integration in business operations. Thus, because of the problems that we face after applying solar panels, especially in reducing their efficiency, as well as the long time we take in order to reduce dust on the upper surface panels, such as cleaning external buildings, whether in the photovoltaic system or in ordinary glass panels, the idea of an automated cleaning system came to solve this situation, taking into account the theory and a practical solution, supporting the technological and sustainable development of management and working to balance the situation economically in proportion to what we are facing in our present from various environmental factors such as Covid-19.

1.15 Research Questions

1. How many times does we clean the exterior surface of the building we live in?
2. Do we have time to clean the ordinary glass/ solar panels in our daily life?
3. How many times do we clean the photovoltaic panels/ ordinary glass?
4. Does the use of Auto-cleaning system can help in developing the environmental impact of our world?
5. How the users compare in human health outcomes after the use of the auto-mechanism cleaning technology system?
6. Till what level have the modern services affect positively the human attitude?
7. Does the auto cleaning system provide a clean exterior environment and improve the human health?

8. Does the auto-cleaning system improve the governmental economic impact, positively?
9. Do you think, the use of Auto-mechanism self-cleaning System increase the efficiency of saving energy?
10. Based on your experience, till what percentage, the efficiency of using Auto-mechanism self-cleaning system can increase?

1.16 Significant of the Study

The study is important because it is structured in a way to improve different aspects in the project management as well as improving the human health in the present of covid-19, in addition it provides a healthier environment supporting and improving sustainability, it's moving forward a business solution to improve the importance of human beings as well as people will not be any more worried about cleaning their windows from dust or any other impurities. Also, the project will take care of the outside general view, that has always been the center of attention for many stakeholders.

From governmental point view, the implementation of the project will serve the form of the government, in the aspects of real estates and consultants as its one of the most important aspects which will rise up with the economic aspect, the project has low risk if it will be well - handled by the right manufactory using a high-quality material, and a well-trained hand power.



Figure 10. Principals of PM framework in link with dissertation Bing, J. A. (1994).

1.17 Aims, Objectives & Scope of Work

In order to have a continuous process to a solution and findings, the structure the dissertation will be linked to each other in a life cycle methodology, the following objectives will determine the communication to reach the aim of the study.

The study is to evaluate the different aspects of project management among the organization, manufacturing and business case considering the project management as the core category, the study seeks to achieve a new vision in the built environment for the organizational growth and an architectural growth from technology and sustainability performance , however, the study is analyzing the different study of the researchers enhanced by a qualitative approach , therefore the researcher is following the interview and a questionnaire approach supported by evidence in which can result a logical and methodical deduction research , however, the recommendations and the discussions as well as the analyzing and the business case of the study tended to add more value to the research content.

1. Optimize the sustainability methods in the construction areas by adding an auto-mechanism self-cleaning system in addition to store the sun rays in the solar panels systems.
2. Optimize the auto-cleaning system by adding high quality elements.

3. Optimize the solar panel glass system and the normal glass by adding a voltage sensor with the cleaning system that is work based on people needs.
4. Optimize the ordinary panel glass system by adding an auto mechanism cleaning system that is well-designed in order to serve the exterior industrial overview.
5. Promote the stages with the respect of adding a water sprinkler system.
6. Improve the productivity between the sources to balance performance between the elements and reach the successful of human healthcare product and a different side of project management improvement.

Where the first and the second stages are focused on a continuous cleaning system to the object- business study to select a high-quality object, and a discussion of a different ways to store the x-rays, and link it with the third target by adding a new cleaning system method in which both can work on the ordinary glass and the other one in a solar panel glass in which the solar panel are already improved by the original creators, the fourth stage in link with the third stage, fourth , fifth and sixth.

The dissertation explains the basic characteristics of a touch sensing system using the performance of the communication and connections between them, determined in terms of the signal distance between the objects and the sensor surface, is analyzed. Finally, the working mechanism of the analysis check is detailed, as well as lead the project to it's successful.

1.18 Arrangement of Chapters

The following structure illustrating the flow of information within the respective chapters relevant to the research.

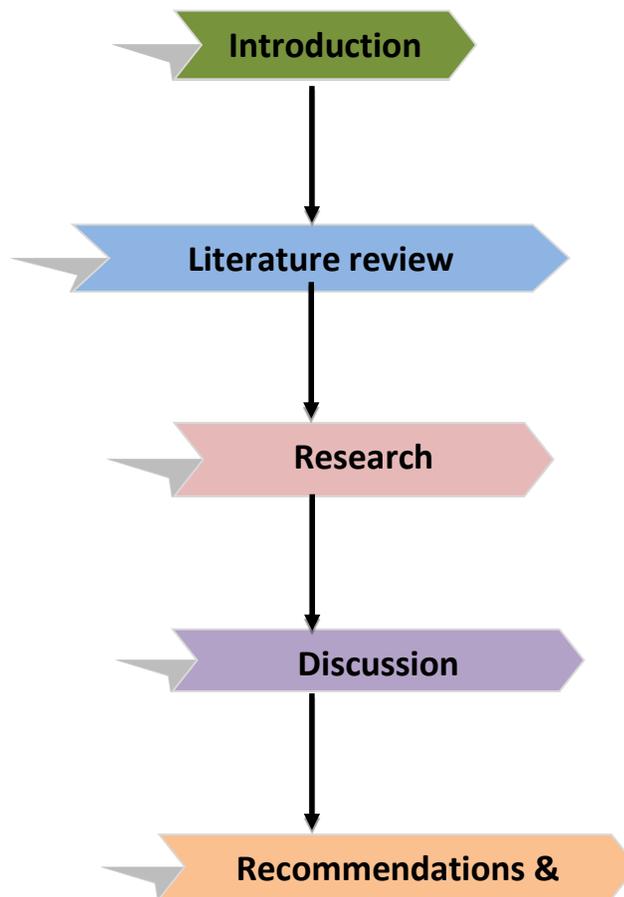


Figure 11. Arrangement of chapters

According to the above-mentioned figure, the first chapter of the study illustrates the introduction relevant to the research content, which includes research background; followed by the problem statement, research aim, research objective and importance of the study. It also involves the scope that the research might have faced while performing the research.

Chapter two entails an intensive and important component considered as the literature review. The commenced theoretical component tends to integrate all the conceptual insights

accrued through different researchers and articles. It helped to offer basic knowledge relevant to the research content material.

However, the third chapter aims at the methodology of the interviews that are conducted and the analysis of data through the expertise of engineers. The whole procedure includes the way they conduct discussions and answer questions about the topic, and in regard to collecting the most accurate information from their experience in the field and relevant to the content.

The fourth part includes the discussion part related to the results and repercussions compared to the analysis of previous research, as well as an experimental work plan that was implemented on the topic of the research.

The fifth chapter tends to involve various recommendations that have been made by the researchers based on the entire research study that might help the governmental organization to obtain an effective framework of risk management in mitigating the issue.

CHAPTER 2. LITERATURE REVIEW

2.1 Introduction

Solar panels a competitive resource to save the waste of the electricity in the exterior design as well as in the interior design, but the researchers believe that the study of the solar panels it's not finished yet, because it didn't cover many aspects yet and it's still focusing on the exterior more than the interior because of the high exterior heat.

2.2 Solar panel and the process of sustainability

A comparative of a study between two glass windows using infrared rays in the summer at high sun temperature, and found that the protective glazing, with small slits in one of the window panels, induced a hot-air pocket in its upper part due to the insufficient ventilation. (Gonçalves, H., & others. 2012) due to the focus on the economic side nowadays there was a study that is mainly focusing on comparison between the photovoltaic system and solar panels system to find out that the solar panels can be considered in the large projects while the photovoltaic system is usually considered as a direct method in the small projects (Mohammad, H.& others 2018) . Exposure of glass windows to high temperatures and dust leads to fading and weaknesses in the strength of the materials contained in the glass. The Dubai government has also included a list of interior building materials that help maintain room temperature from heat and, in turn, preserve glass from inside (Dubai municipality, 2016).

“What Replacement Windows Can't Replace: The Real Cost of Removing Historic Windows,” 2005). In which changing the small glass windows into solar panels and cleaning methodology will keep the identity of the community, on the other hand the cost will be reduced which give a few steps up for the sustainability to be improved. Filling the gabs in the sustainability environment through studying the environment climate change by studying the daily change of the sun temperature as recognized in the early morning the temperature is cold which is good but because of the moist texture in the glass window and the glasses became dry in the present of the sun till afternoon to reach its highest degree and reduced again between 3pm to 6pm till midnight to reach the coolest specially in the winter while in the summer the temperature is low if the

humidity is high and the opposite in case of the temperature is high (Sedovic, W., & Gotthelf, J. H. (2005). The use of three technologies, wireless technology, nano technology, and biotechnology can solve the sensing methodology, innovative technology and improving the quality of water waste as well as improving the sustainability development (Brook, W. Abegaz, 2018), sensors and technologies perspective are critiques from sustainability point view because of the interests of improving the methodologies in the sustainable environment in the construction sites. The US Department of Energy has proposed a new sensor and data analysis system to improve the performance of a sensor system called MYPP in electrical plants in which its focusing on felling the technological gaps by adding values on what it's done by implementing a project report (MYPP) through GMI sensing , measurement system , data analyzing and communication in order to determine the real-time between the normal operation system and technological operation system of the electrical power and filling the disturbances by using the technological system in the normal operation system. To ensure the safety of users, it is necessary to spread awareness and spread the remote sensing system by raising awareness of the methods and objectives of using the system, provided that the final cost is low, and quality is improved by controlling product transactions. For the success of the project, an analysis of the technical and material risks and benefits of using technology must be done. To implement a remote sensing system, it is necessary to develop and detail product rules for validation testing, to clarify methodologies and tools for evaluating product technology, to assess new product technologies for future development, Providing the regulatory authorities with clear tools, inputs, processing, and outputs to adopt technology and ensure security, from search to development to improve the importance of the technique. Sensing systems using technology leads to lower costs and consequently more deployment and distribution, for continuity, it is necessary to analyze the gaps and draw the design-to-implementation method. Their manufacturing processes depend on engineering flexibility and the lack of tools by gaining more time to make development adjustments in the event that modifications are added in the design and thus the daily production rate increases with the technological development of the process of product installation and manufacturing in less time. Their three-dimensional structures are considered the second most complex stage, especially structures Which contains functions followed by a sensor system or an electronic system (Fender, s. 2016). A large number of studies

performed during the last decade demonstrated that dust accumulation on PV module surfaces may cause a significant decrease in solar conversion efficiency (Darwish et al. 2015).

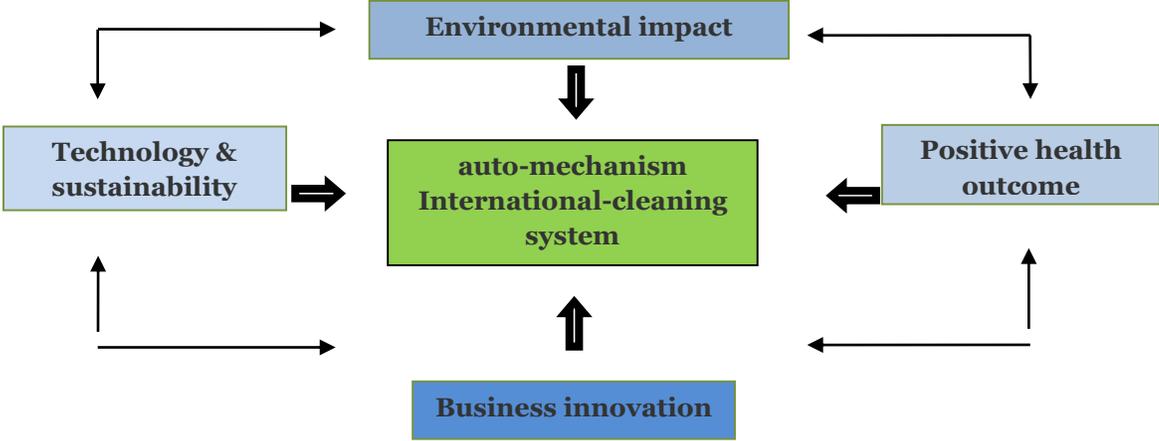


Figure 12. Auto-Mechanism International Cleaning System – Conceptual Framework (Created: By Author)

Conceptual factors, the framework of the Auto - mechanism self-cleaning system depends on factors related to construction sites and viruses that we face in our societies, and to identify the aspects of risks faced by humans, especially during the period of Corona Virus, from the deterioration of their health in addition to the economy of governments and stakeholders. Orientation to development in several ways in the technological and sustainable frameworks to reduce risks in construction sites is one of the priorities of the tasks that are considered continuously to achieve the goals effectively, the conceptual framework depicts the frameworks that were focused on in the dissertation and the way in which the concepts were linked to reach To effective results that serve human health in particular and society in general, and these concepts are directly related to each other and to what we are facing in the present. The conceptual framework also depicts a roadmap to the extent to which each conceptual framework relates to each other to determine the priorities of tasks, their synchronization, the extent of their interrelationship and conclusions in order to reach effective results.

2.3 Environmental issues – cases

All problems related to air pollution are caused by three main reasons, which are air speed (wind), the amount of dust, and humidity, which are one of the main reasons for sticking soil and sand to the surface of the solar panel, and even traditional surfaces. Dust on the surfaces of panels, especially in Europe, is caused by melting snow and by rain, and this reduces the negative impact on photovoltaic cells, the present of the dust is reducing the photovoltaic efficiency by 50%, according to a study conducted in Saudi Arabia, and the lack of continuous cleaning may lead to material, tangible, and economic losses. A study was also established in Poland on one of the roofs to find out the weight of the dust accumulated on that roof, and the study was practical and as follows: a container was brought outside and placed in it a quantity of ice for a number of hours, and when the snow resulting from the winter season melted in the Krakow region, I wait The researchers studied the adhesion of the accumulated dust with the water first, and then the dust only, and then they measured the weight of the dust with a study of the wind speed at that time, as the environment was crowded with buildings and the percentage of wind in it was less than the open areas.(Katarzyna, S. & others 2018). Moreover, the table below shows the percentage of the dust from solar panels and windows in the construction management that effect the human health and the places of infections on human body.

*Table 1*Effect of each particulate matter to human-being (Al-hesnawi, A. S., & Alsalman, I. M. (2017).

Size of particulate matter less than	Effect
PM100	Noise and mouth
PM10	Deep of Respiratory system
PM4	Blood stream through respiratory system
PM2.5	lung cancer
PM0.1	Human vision



Figure 13. Rise in PM10 (particulate matters) which cause the air population as well as reducing the human health. +10PM10 = 0.05% death yearly



Figure 14. Dyson company studies for indoor air pollution of PM2.5 and PM0.1 result: indoor air-pollution much more than the outdoor pollution <https://www.dyson.ae/en-AE/products/air-treatment>

2.3.1 Key risks of the present implementation of cleaning windows and solar panels in the construction areas.

The main risks in cleaning methodologies of the solar panels in the construction areas of the present implementations that the cleaning system stopping sometimes because mainly of the circle of budget it costs a high amount, in the next stage the implementation of the building materials cause a difficulty in washing the buildings, especially if the building has an old age, like more than 10 years. the third risk is the cost of the building materials (such as painting), any damage might the cleaning service company cause it will affect the cleaning company negatively, as well as the building owners (depends on the cases), the forth risk is the considerations of safety if it is not properly taken in to consideration, it will cause a risk to human-being, the fifth risk might happen during the cleaning execution if one of the machines it doesn't work ,or a negative thing happen to the rope that handle the cleaning worker. The maintenance of the machines used itself it needs an amount of cost.



Figure 15. Current Practices of Cleaning Methodology
<https://www.thespruce.com/glass-cleaning-tips-1900306> .

2.4 Manufacturing Consideration

In the presence of the Corona virus, it preferable to manufacture a self-cleaning tool, both in the outer glass of the building and in the inner glass of buildings, such as tables, windows, and upper glass shelves, for several reasons, the most important is the need to protect human health

from surface pollutions and exterior air pollution, also these sites are often difficult to access easily, and it takes a long time. the project management and strategies in this matter lies in first taking human health as a top priority to preserve it from pollution that is concentrated in places that are difficult to reach daily, such as cleaning high-rise buildings(towers), medium-rise and low-rise external glass buildings. Regarding solar panels, it necessary to find a self-cleaning mechanism in order to protect the cells from breakage. The same cleaning mechanism that can be used in ordinary glass may be used with a slight difference due to the thickness of the solar panel's cells and ordinary glass cells, this can be done by providing a demo video that can be used as a guide for the project to be worked on. The dissertation is reviewing a technical, sketching development of the use of sensor cleaning system than can be work successfully in the interiors and exteriors. (Researcher. 2022).

2.5 Photovoltaic Security Consideration

To ensure the security of photovoltaic panels, daily health practices are necessary, both from a technical and technological point of view, especially since the panels have become more widely used in project roofs and facades. It has also been observed that photovoltaic energy has a greater negative impact on the life cycle compared to solar energy with a difference of one megawatt per hour (Mohammad, H. & others 2018).

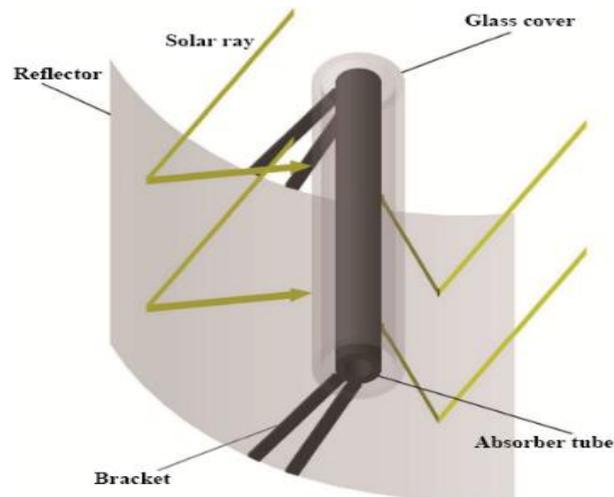


Figure 16. Security system as well as the sun light focus to direct the light into the solar panels for the case in large projects. (Mohammad, H. & Others 2018).

2.6 Sensor System

Capacitive Touch Sensors Since these sensors can be produced very easily at a very large scale can be made at very less cost and are very attractive in design. These are widely used in iPods, mobile phones, home appliances, automotive, and many other industrial applications. They are used in applications such as measuring pressure, acceleration, distance, etc. Resistive Touch sensors are used in Foot pronation monitoring, musical instrument, keypads, and old mobile phones. <https://www.electronicshub.org/>

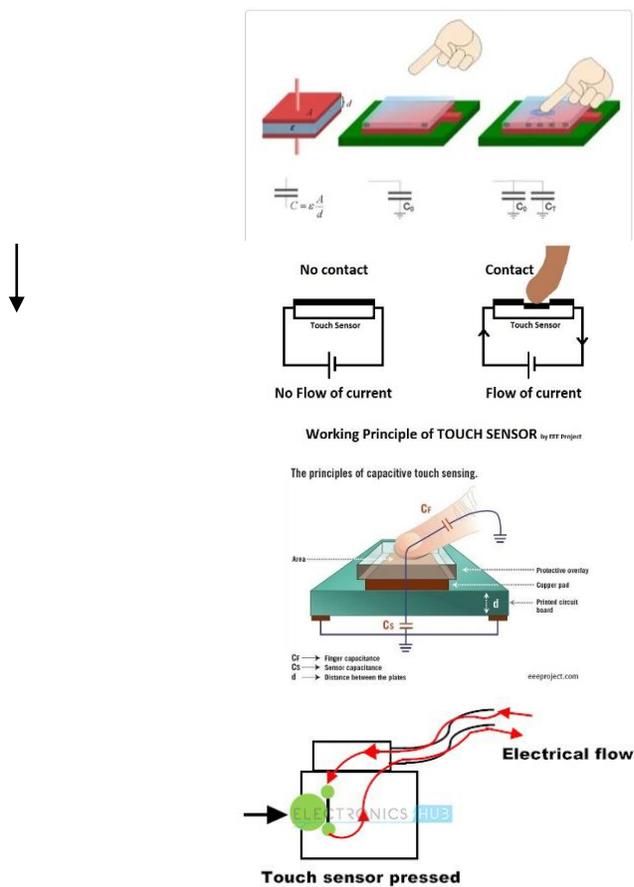


Figure 17. Touch sensor system <https://www.electronicshub.org/touch-sensors/>

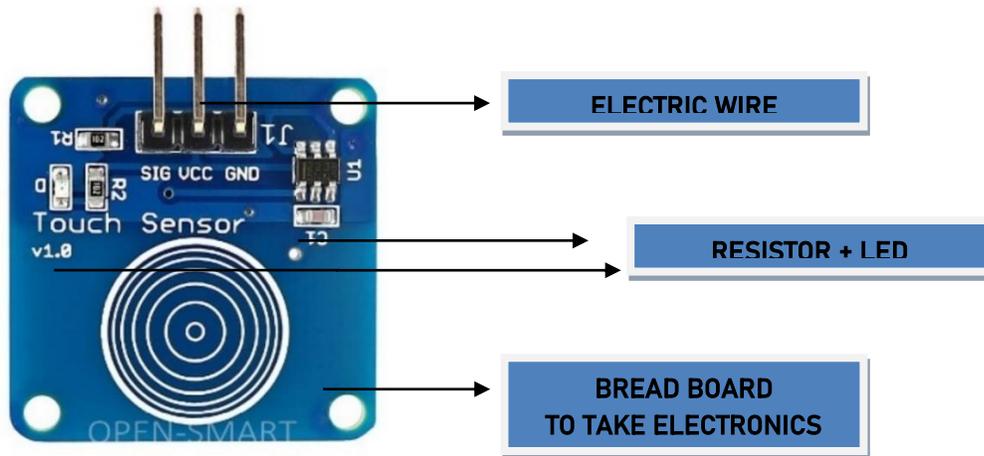


Figure 18. Touch sensor working principle <https://www.electronicshub.org/touch-sensors/>

The tactile sensors are the sensors that sense the hand, which contain a special surface, followed by a group of consecutive surfaces that are isolated from each other with an insulator with a maximum area of 40 cm, which he manufactured. It depends on reading the temperature of the human hand. The remote-control panels show an infrared light signal owned by both the remote-control panel and the mechanical self-cleaning mechanism, as each receives and sends these signals to each other, to receive commands and respond positively to the other (Lazar, c. & others 2008).

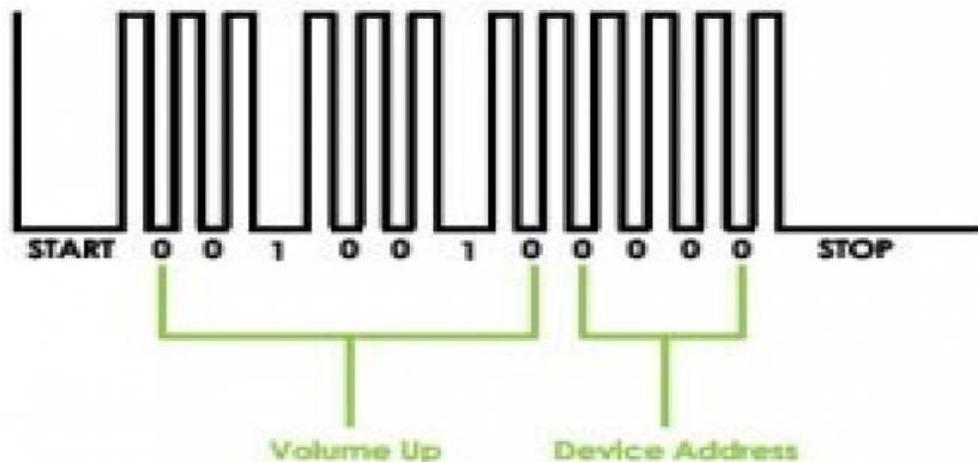


Figure 19. Signal system of the remote control (Lazar, c & others. 2008).

Remote control has almost the same working technique of the sensor system, in which each one of them is linked by Infrared Sensor Module to read each other with the main product. (Lazar, c & others. 2008).

2.7 Discussions

Katarzyna, S.& others 2018 in his research finds that the air pollution it doesn't affect the human health only but it also effect the efficiency of solar panels by at least 50% , there is a need of a daily cleaning for the photovoltaic itself in order to not lose saving the sun x-rays in it for the use of sustainable electricity , also the conditions in Europe is totally different from the condition in the middle east, as in Europe the snow and rains can clean the photovoltaic cells as part of the solution , while in the middle east because of the nature of the weather that will usually cause dust accumulation in the cell.

Table 2 Positive & negatives of environmental natures on humans

Natural	Negative for (photovoltaic)	Positive for (photovoltaic)	Pollution Resource	Causes
Wind (wind speed)	Thick layer of dust	Might clean the dust layer	Oil resource	human beings
Sand	+PM10	-	Transportations	human use
Rain	After dry layer of dust	Wind speed with rain	Gasses such as o3,	90% harm
Ice & snow	Wind speed + ice	Wind speed & snow	Chemical pollution	human beings
Results: the negatives effect, human health, animals' health, and planets health (Frank, R. 2017)			(Al-hesnawi, A. S., & Alsalman, I. M. (2017).	

A study was developed by researchers, summarizing the percentage of pollution present, and the study was concerned with placing a quantity of plants in the area to be studied, as it is one

of the living organisms most affected by the environment, which will give more truthful results, with the development of characteristics for these plants, which are as follows, that the plants are suitable To live in the site to be studied, secondly, that these plants have the ability to predict in terms of the extent of their flowering and reproduction, as their prosperity indicates the lack of pollution and the suitability of the environment for them, while the withered plant is not commensurate with the environment, and that we cannot skip the seasons, and it showed the results are that plants have a great ability to absorb toxic substances in the air and to absorb air pollutants from gases of sulfur, nitrogen and other undesirable substances. (Assad, M. E. H., & others (2018)

(Gonçalves, H., Aelenei, L. E., & Rodrigues, C. (2012) Emphasized that it is necessary to close the openings that result from installing windows in construction projects because of the entry of hot air, which in turn may limit the absorption of solar energy for solar radiation also having an openings in windows will lead to not cooling the inside room when Air conditioners are turned on, which will cause a loosing of electricity without benefits from the cold air that must come out from the AC's .

(Sedovic, W., & Gotthelf, J. H. (2005). In his research paper studied the importance of studying the environmental changes in term of sun x-ray which help to study the efficiency level of the solar panels. (Brook, W. Abegaz, 2018) in his research paper addressed the importance of using technologies which what it interests people now adays for a better life.

(Fender, s. 2016) supported the different project management aspects, his system focused on filling the gaps from technological aspect and the system respect that any project has a sustainable and a technological foundation, should be supported by a clear life cycle to make the process easier for the developers as well as to people. Following fender system will always remind us to clarify the tasks before working on each task.

While the study of (Brook, W. 2018) and (Fender, s. 2016) concluded that it is necessary to include innovative technology to facilitate human life by adding sensor systems that work without human allowance for any efforts in addition to shortening and reducing time.

In their studies, all researchers resorted to finding different and positive ways and solutions to serve the environment and our societies, including improving sustainability methods and

different technologies in more than one field and with a different attempt to make sustainability and technology a success. The project can be used in cities, villages, and suburbs - as it was found difficult to activate these systems in villages and suburbs previously.

2.8 Gap Analysis

Several effective experiences have been discussed in the literature review in evaluating the efficiency and cleanliness of solar panels and ordinary glass in construction sites and their management after implementation in addition to finding a new way to install a sustainable and technological system in construction sites. The different experiences of the researchers and the support of the research dissertations with the idea of managing a new project. This happens to be a gap in the literature review. The research aims to process and obtain all relevant information regarding the identification and evaluation of the project based on the experience of the interviewees and the discussions analyzed and discussed in the research work that emphasizes the results and activities appropriate to the idea that aims to solve one of the construction site gaps faced by many stakeholders. The research mainly highlights the various points of view and the experiences of different researchers to evaluate and determine all the points necessary for the success of a new idea that will facilitate the health of human life and governments economically.

CHAPTER 3. METHODOLOGY

3.1 Data Collection Method

The research method is chosen to conduct the research appropriately to reach the positive results. The interviews were conducted to analyze the research objectives and questions. Data collection was carried out in a manner parallel to the research objectives.

There are questions asked by engineers according to the research and its objectives. The researcher applied the analytical method and comparisons between researchers to improve the effectiveness of the research and continue to improve the quality of data in order to reach the product. The results of the experiments that have been considered were made by considering the various advantages and disadvantages of the research conducted by the researchers. Besides this effective implementation of descriptive and inferential design.

The "Questionnaire" was launched through the website as an accurate and effective means of data collection. With regard to the collection of accurate data, the engineers were asked to participate in the discussions and to provide feedback regarding the content of the topic. The participants were also asked to provide their knowledge information that might help in obtaining better results. And open the door to add more questions to be answer as many of them as possible and considering the reasons that lead to the success of the research, theoretically and practically Participants were asked to answer all 10 questions that would lead to better productivity Regarding the research topic. There were spaces for the participants to provide their personal comments. The interview also started.

The interviews were a series of another interrelated questions related to the same objective that helped in the appropriate productivity of the combined result. The overall result of each of this data collection method helped in deducing a clear visualization of the goals to be reached.

3.2 Reliability & validity

The main targets of the research are the engineers from different departments. In terms of the researcher's reliability, it is suggested to provide a genuine confirmation letter, which serves as the ethical approach and supports the standardization of the research. Through the exercise of the research design, the reliability factor for this study was increased. However, the researcher used emails and some e-books as data collection tools, and the bulk of the research data confirmation relied on permission from some engineer officials for interview methods. This particular step allowed the researcher to conduct the necessary analyzes to clarify the final picture without any kind of obstacles .And the survey questions were modified to reach meaningful results.

3.3 Analysis Techniques

In order to collect data on this topic, it was relied on collecting experiments and taking opinions based on the results of analyzes in addition to interviews via Zoom and answering a set of questions by discussion.

3.4 Interview questionnaire

The following questionnaires is summarizing the interviews of analyzing the gaps that happens in the construction sites and the support of the new method (idea) that can be address during the construction period to reach the construction management from sustainability and technology side in both aspects the theoretical aspect and the practical aspect.

3.4.1 Interviewee feedback 1

Table 3 Interview feedback 1

	Solar Panels	Ordinary Panels
How many times does we clean the exterior surface of the building we live in?	Through cleaning service companies, 6 times a year	
Do we have time to clean the ordinary glass/solar panels in our daily life?		NO
How many times do we clean the photovoltaic panels/ ordinary glass?		once every 2 months
Does the use of Auto-cleaning system can help in developing the environmental impact of our world?	I have to try it in order to determine & improvement of its success.	
How the users compare in human health outcomes after the use of the auto-mechanism cleaning technology system?	Our health is already affected, but there is no doubt the product can improve the human health outcome	
Do you think, the use of Auto-mechanism self-cleaning System increase the efficiency of saving energy?	If its properly fixed and the product elements was based on a proper study, then it will increase the efficiency of the panels	
Based on your experience, till what percentage, the efficiency of using self-cleaning Auto mechanism system can increase?	It's difficult to determine without using the product	
Till what level have the modern services affect positively the human attitude?	Depends on the acceptance level of welcoming and supporting new ideas	
Does the auto-cleaning system improve the governmental economic impact, positively?	To be honest yes it will improve the economic impact also it will reduce the Amounts spent on cleaning services	
Does the auto cleaning system provide a clean exterior environment which will improve the human health?	Yes, it does, but still, I have to try the product	

Interview Summary Discussion

Not cleaning the exterior glasses, it seriously effects the human health, as the cleaning process usually once every two months, the price of each one time in the residential buildings is around 1500 Dhs and the cost of cleaning the exterior body in the commercial buildings is approximately 300,000 Dhs, its expensive, purchasing the solar panels itself it’s so expensive, at least the efficiency of it must go in parallel with its price.

3.4.2 Interviewee feedback 2

Table 4 Interview Questions

	Solar Panels	Ordinary Panels	P/N
How many times does we clean the exterior surface of the building we live in?		Where do I live, twice in a year	
Do we have time to clean the ordinary glass/ solar panels in our daily life?		We don't because of daily work routine, you are tired, there is nothing to think about	
Does the use of Auto-cleaning system can help in developing the environmental impact of our world?	Yes, it works as long as it will set correctly		
How the users compare in human health outcomes after the use of the auto-mechanism cleaning technology system?	Supporting it will serve human health		
Do you think, the use of Auto-mechanism self-cleaning System increase the efficiency of saving energy?	Yes, if its set in a way to increase the efficiency of saving energy		

Based on your experience, till what percentage, the efficiency of using self-cleaning Auto mechanism system can increase?	If the product is used and set up well it can increase, it by 80%
Till what level have the modern services affect positively the human attitude?	It can as long as there are aims to do
Does the auto-cleaning system improve the governmental economic impact, positively?	It will reduce the spending of governmental money
Does the auto cleaning system provide a clean exterior environment and improve the human health?	Yes, as long as the product will be implemented in the exterior facades of buildings.

Interview Summary Discussion

It's important to link it to project management and in order to do that you need to determine how the implement of renewable energy can be implemented in the residential villa for example, and to work on it from renewable perspective than solar perspective in addition to sustainable strategies, what is the solar strategies that we can use in residential villa in order to reach efficiency. What is the strategic that we can work on it in order to reach the efficiency of renewable energy?

1. Use the Auto-Mechanism self-cleaning system
2. install the solar panels in the right place, and the right position
- 3.reduce the cost of the solar panels to decrease the use of electricity and everyone can use it, whether in cities ,suburbs, or villages.
- 4.programe the solar panels in a way to catch the highest degree of sun rays.

3.4.3 Interviewee feedback 3

Interesting idea but you will have to work on many aspects such as the programming methodology, you will need to take care on the implementation of water system to not affect the passers and it will not fall down randomly on cars, especially in high-rise buildings.
You will need to have a look on the exist cleaning system methodology as there is a manual as well as an automatic.
You have to think about the way you are going to use in implementing the rubbers in the buildings which has a closed window, which will be difficult to change the rubber and again you will need the Crains and manpower to do the work
What will you do with the old rubbers? Is it ok to recycle it?

3.4.4 Interviewee feedback 4

Table 5 Interview Questionnaire

	Solar Panels	Ordinary Panels	When applying the product
How many times does we clean the exterior surface of the building we live in?	At least once a year	Twice a year	
Do we have time to clean the ordinary glass/ solar panels in our daily life?	No	No	
How many times do we clean the photovoltaic panels/ ordinary glass?	TWO	Two to three times	
Does the use of Auto-cleaning system can help in developing the environmental impact of our world?	YES	Definitely, YES	
How the users compare in human health outcomes after the use of the auto-mechanism cleaning technology system?	No response	No response	

Do you think, the use of Auto-mechanism self-cleaning System increase the efficiency of saving energy?	YES	NO	
7. Based on your experience, till what percentage, the efficiency of using self-cleaning Auto mechanism system can increase?	-	no response	Around +40 to +45%
Till what level have the modern services affect positively the human attitude?	No response	70%	
Does the auto-cleaning system improve the governmental economic impact, positively?	Yes	Yes	
Does the auto cleaning system provide a clean exterior environment and improve the human health?	YES	Yes	

Interview summary Discussion

It needs to be done as a prototype because it will let us have a clear idea about the mechanism work of the product and the way of implementation, also its important to know the scale of implementation , of course it will develop the environmental impact and it needs one to two years to implement the product in urban scale, the cleaning methodology of the louver of Paris is automatic, but the working mechanism of the louver of Paris is more difficult and heavy and cannot be handled by people while the auto mechanism self-cleaning system, is a product which can be handled by everyone , with a reasonable price for all and easy-moving. Regarding solar panels there is nothing to do with the maintenance, lack of maintenance in daily life, even if you got an excellence maintenance but if the panels are not fixed properly, then it will have an efficiency problem.

In Algeria a study on 70's, the objective was that they spend more time to see how it will be maintained without technicians and to be easy to the occupants/ owners to give them the freedom to maintain by themselves, this was one of the targets at that time, because of the lack in installations

because the village was far from the main cities, also the village is a dissert area it was little difficult to remove the sand from the panels.

The implementation method in low-rise buildings will be different from the implementation method in the high-rise buildings because the fixing methodology in high rise buildings its different from the fixing methodology in low rise buildings, as well as in mid-rise buildings – it depends on the type of the glass, the fixing method, and its design.

3.4.5 Interviewee feedback 5

Table 6 Interview Questionnaire

	Solar panels	Ordinary Panels
1. How many times does we clean the exterior surface of the building we live in?	Refer to interview discussions	Once or twice a year
2. Do we have time to clean the ordinary glass/ solar panels in our daily life?	Refer to interview discussions	No
3. How many times do we clean the photovoltaic panels/ ordinary glass?	Refer to interview discussions	Between once every one month and once every two months
4. Does the use of Auto-cleaning system can help in developing the environmental impact of our world?	Refer to interview discussions	It depends on
5. How the users compare in human health outcomes after the use of the auto mechanism cleaning technology system?	Refer to interview discussions	Refer to interview discussions
6. Do you think, the use of Auto-mechanism self-cleaning System increase the efficiency of saving energy?	Refer to interview discussions	Refer to interview discussions
7. Based on your experience, till what percentage, the efficiency of using	Refer to interview discussions	Refer to interview discussions

self-cleaning Auto mechanism system can increase?		
8. Till what level have the modern services affect positively the human attitude?	Refer to interview discussions	It will make life easier
9. Does the auto-cleaning system improve the governmental economic impact, positively?	Refer to interview discussions	Saving costs will be good in large buildings
10. Does the auto cleaning system provide a clean exterior environment and improve the human health?	Refer to interview discussions	Refer to interview discussions

Interview Discussion

It's a group of tasks, including a cleaning-product in which it should be manufactured widely and implemented. Its name is the auto-mechanism self-cleaning system usually users and stakeholders does clean the surfaces once or twice a year. for someone who is living in an apartment or a villa usually its cleaned by someone who is hired to do this, and in solar panels it has to be something different because it's having a special arrangement and required more cleaning sequence than regular building, also it depends on the followed cleaning strategy, most of people will do it on regular bases like every month, some people will prefer every two months, some people will do it every two weeks, others as needed, you look at the perfection of the panels and once it reaches a certain value you clean it so this going to happen within a week to two months, the condition of the solar panels if it's done based on performance base cleaning and on the period cleaning, in which we clean every month, but this does not guarantee the performance of the panels.

There is a lot of work on this area, the rate of rain, some areas it depends totally on rains to clean the panels, while in some other areas rain might cause an issue through resulting a dust after it dry, and it is not the same everywhere it depends also on the local conditions.

Classifying a different cleaning strategy in different countries, and then decide about the system, determine a location for the most suitable strategies. The x-rays, and extracting the sun, the solar maps, the locations which have highest solar radiation, the locations which has lowest solar radiations, all these well-known and well documented.

In United Arab Emirates it's important to address the type of water weather its normal water or practice water, the piping system, potential bacterial approach, recycling the used water to clean the glass it can cause a wellness to people around it, there is a minimum level of cleaning that you need to do to treat the water before it cleans, even if it is just for cleaning practice. If you are going to recycle the water if the water has organics from bathrooms, toilet, extra... there could be bacterial, and microbes in the water, if you used this water in the surfaces the bacteria will be there in the surfaces, the product. Considering the collect additional of water to have enough water for repeating, analysis of how much water can be collected from rain, the rain water might not be enough, also considering the cost of the cleaning, wither it is filtration, equipment, electricity, you should have enough pumps , so there are other cost you need to consider during the system itself, It will make life easier, usually if they find something which will make their life easier, they will be happy to use it, and will have an impact on the owner of the government, certified for the large buildings, might not be certificate for small buildings, considering the number of people that we need to reach the successful of the product, also they have to be well trained during the installation of the product element's, and the product elements it's not a difficult element that we need to create from nothing, it's all exists with a very good prices, it's just a matter of grouping and implementing as well as fixing, and end by having a new product that is not exist yet. the water goes in to one direction, only around 10 to 20% the water fly, and rest of the 80% it goes to the floor, which mean we still have a good percentage to save as much as we can from water to clean the glasses for the case of cleaning the buildings.

The quality of the product and the elements used should be improved in high quality, also if it's improved to be manufactured, the manufacturing in this case should be mechanized well, supported by a well-trained manpower , the water that will be recycled in building, because it's the best way to implement the product and the product treatment successfully in

order to reach the successful to clean the glasses with the ordinary glass which we use mostly, or the solar panels which it became widely in use, from this point view considering the water strategic system to follow in order to implement it in the right way and as it should be, The water recycling strategy that I have to use, is the recycling system that will serve a building specifically , It's not the recycling system that is taken from the used water such as toilet, kitchen or even from the water that we use in our daily life and then implemented in treating the grass, parks, landscape because that will cause disease, that's why it's difficult go through that direction.

The recycling system that needs to be implemented it's a new strategy that we should implement in order to serve the cleaning of this part of the building (building elevation, ordinary glass, and/or solar panels), the implementation of brushing product to clean the solid part of the building. The product is not to clean the glass and then to recycle the water from the kitchen and toilets used water to use it in cleaning the glass because that will bring wellness to people, it's difficult to take that direction of strategy, considering an implementing of totally 100% new pipes, linked with a new water tank filled by 100% cleaned water, just to serve the water system and the auto-mechanism self-cleaning system product, which will clean the glasses panels through a remote control and a sensor system and then during the cleaning process there is a water mixed with dust (after cleaning) it will go to another water tank, which will add on it a filter system, in order to clean the used water and re-cycled the same water to clean the building glasses but I can guarantee the recycled filtered water it's still the only water that we used to clean the glass at the first stage. And because of the remote-control system the users will have the freedom to clean the panels whenever they believe that the glass needs to be clean, because the programming of the product is mainly built to work daily, weekly, monthly, yearly, it's up to users.

CHAPTER 4. RESULTS & FINDINGS

4.1 Auto – Mechanism International Cleaning System - AMICS

The sustainability in high glass materials were complicated to install until it was found that it is easy to manufacture in factories or convert them into pieces and install them without clearly showing the boundaries of the glass pieces after installation. The researches of the specialties it focused on serves the difficult reachable areas, Hence, I find it necessary to focus on the type of glass pieces and their homogeneity with solar panels in terms of color, shape, depth and extent The surfaces match each other while maintaining the importance of building a cleaning mechanism that matches the type of glass, whether traditional or solar panels, and while they are combined, also to implement the product in to the glass window. The impact of the resource based on architectural and technical as well as on a strategic plan of a consultant management of architectural engineering academic organization based on searching on the thinking methodology.

4.2 Estimating the Use of the Product from Environmental Aspect.

The below schedule shows the estimations of using the water during the process after fixing the product, the percentage of estimations can determine the saving of water for the purpose of recycling, the evaporation, the humidity and all the environmental aspects it depends on the building direction, sun direction into the building and the weather.

Table 7 AMICS From Environmental Aspect

Estimations	Percentage	After/before cleaning	Caused by
Estimation of lost water	40%	After cleaning	Water evaporation
Estimation of observing water	10%	During cleaning	heat- humidity
Estimation of saving water	60%	After cleaning	
Estimation of saving water	70%	Before cleaning	Wet weather
Estimation of saving water	5%		Rain weather
Notes			

The percentage of saving rainwater will be higher above earth, with a proportion of percentage will not exceed 30% (estimated %) depends on the opening and the location of the water tank itself (how wide it is) While water tank under the earth, almost rain will not reach it, unless if there is a system of ability to bring in & out the water tank itself.

It is necessary to adjust the water pumping ratio during the cleaning process

It is necessary to direct the water pumping device during the cleaning process

Product has zero maintenance it's a matter of changing rubbers yearly and when needed

Product has zero maintenance it's a matter of changing brushing system yearly and when needed in case of implementation the part with the wiper, in this case it will consider as two types.

It's a matter of implementing the electrical items & sensor items properly for a long-term product.

In order to avoid the evaporation of the water – the water system can be implemented inside the brushing system, that will save the water and the estimation of losing water will reach 20% instead of 40%.

(By Researcher)

4.3 New Propose Mechanism

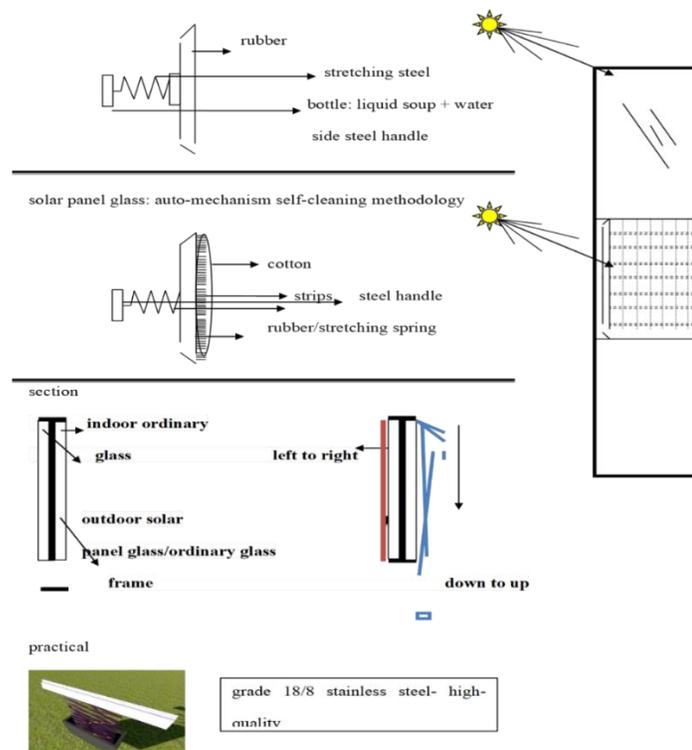


Figure 20. Vision to AMICS

Table 8 AMICS – Financial Performance

<i>AMICS Vision – financial performance</i>					
scope plan	Image	Quality	Quantity	Cost	Existing types/size
Wiper		Brand New	2	50\$(1)	Many Size- based on windows sizes
Rubbers		Brand New	2	9\$	5 types Size- based on wipers
Remote control		Universal	1	10\$	Many Size- based on needs
Sensor tube		DST 1.5 LENGTH 18- BLACK/BETT ER	2	130\$	Many Size-based on the window height
Brushing system			2	20	Many Size-based on window width
Water system		Jet Water Nozzle for Volvo C30 V40 C70 S80 XC90	4	10\$(1)	2/3 types of Standard size, long, wider angle
Programmin g		Set Time quality	Per/unit	11\$/ per unit	One type
Subtotal price	230\$+ owner price per unit (120\$)				

Vat 5%	5\$
Total price	355\$
Price description	Finalizing price will depend on specialists, when all accessories that needs to implement by specialists will be added, & will not exceed 400\$
Color	Black/ common, rest based on the design of the elevations
Speed	Safety and security lows depends on civil defense
Graphite layer	Speed quality should be as faster as the wash of the front glass of the car

This graphite layer is responsible for the smooth and quiet movement of the space above the glass while cleaning the glass well. If the graphite layer is removed, the wiper blades begin to rub against the surface of the glass and cause smearing effects, which reduces visibility and negatively affects the life of the wipers.



Figure 21. Car Water System Circulation – case for the water system for AMICS
<https://www.ebay.co.uk/itm/304063514392>

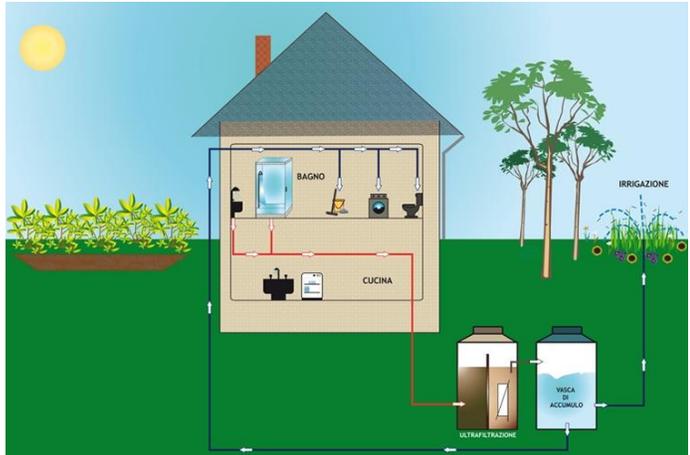
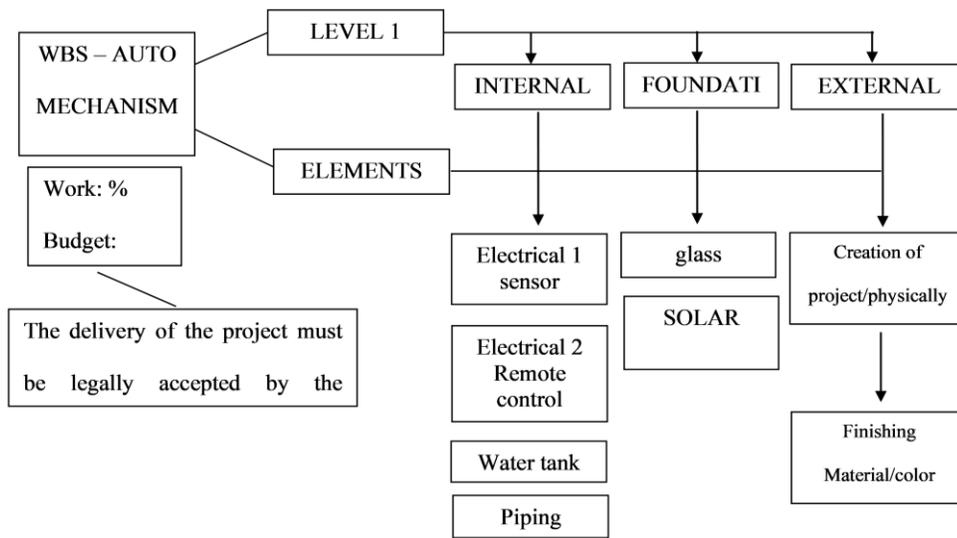
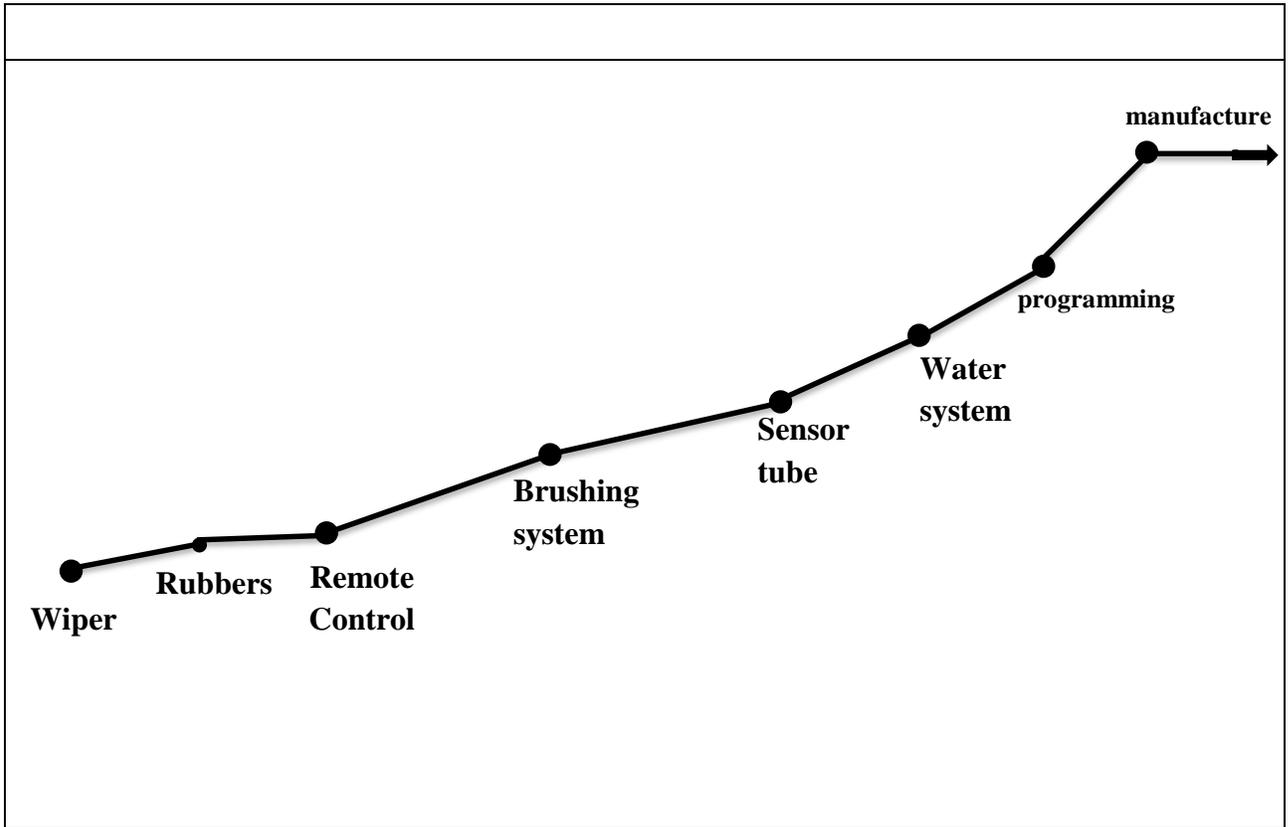


Figure 22. Example of Implementing AMICS to a recycling system on residential project. [Idrocell - Water Saving - Grey Water Reuse System by Idro Group \(environmental-expert.com\)](http://idrocell.com)

4.4 WBS – AMICS Work Breakdown Structure



4.5 Project Plan



The percentage of implementing the project successfully in the construction sites will rise the efficiency of the solar panels, the ordinary glass, and the project successful in to 80%, experiencing the product with a high-quality material and the use of materials that is easy to get will give the chance to everyone to get it, it's important to work on the prototype to focus on bring it to reality.

Table 9 Analysing & Solutions to the Concerns Points During Interviews Discussions.

1	2	3	4	5
Percentage Of Product success				
80%			Good	
20%recommendations		Prototype for large projects		
Everyone's opinions were focused on bringing the product to reality and practically experimenting with it, and then publish the product.				

Future Recommendations	
<i>Interview 1</i>	Reasonable for all users + physical product in order to implement it to one of the villa projects to see the results of it and then implement it everywhere in every building and all types of buildings.
<i>Interview 2</i>	Apply it in a residential, commercial buildings and stress a strategic plan to increase the efficiency of the solar panels considering the next generation.
<i>Interview 3</i>	Add a programming system and find a place where we are able to manufacture the product, support the idea with the right implementation method
<i>Interview 4</i>	Work on a prototype and make it workable
<i>Interview 5</i>	Work on a strategic condition that the product might face after the implementation, and solve it

4.6 Styling Auto-Mechanism Cleaning System (AMICS)

During the discussion on interviews, it was preferable to consider AMICS in the construction sector in general, and the successful of it can serve the human needs specially in the residential buildings (such as villas, low rise buildings) and commercial buildings (such as high rise buildings , and the buildings which has a glass elevations) , the following table is a comprehension and a discussing the optional style of selecting AMICS, the selection of style can go in parallel with the building design and the selection of building material.

Table 10 Auto-Mechanism Self-Cleaning System in Residential & Commercial Buildings- created by researcher

Residential/ commercial buildings	Commercial buildings full exterior glass
Wall to wall fixing methodology	Roof fixing methodology
Color depends on the overall exterior building colors	Black Color with the degrees of blue exterior building colors
Considering the amount of water	Considering the amount of water

Considering the amount of soap	Considering the amount of soap
Water recycling system	Water recycling system
Support the product by a brushing system/ down to up system	Support the product by a programmed brushing system/ circle system
Yearly change of rubbers	Yearly change of rubbers / when needed
Recycling the rubbers such as recycling car wheel	Recycling the rubbers such as recycling car wheel
Easy to reach rubber location	Fit the product on top/bottom of building for an easy reachable to rubbers location for easy change

4.7 Recommendations on Using AMICS (Auto Mechanism International cleaning system)

Clean the solar panels by only water- preferable in order to increase its efficiency, Fix the Auto-mechanism self-cleaning system on the boundaries, Add a brushing system to remove the dust from the solar panels before cleaning it by water, The number of times of cleaning the solar panels must be more than the number of times of cleaning the ordinary glass, for a continuous observing of sun rays to the maximum, Support the product with a programing and a remote control as well as a sensor system to determine the number of time and a percentage to re-clean the panels when needed, Give the freedom to users to use it whenever they want- such as Ac's, The quality of Water recycling will be better because of the absence of soap.

4.8 Progress Decision Making Plan

- Identify participation
- Describe current level
- Identify Factors affecting participants
- Conduct assessment
- Identify strength and barriers
- Generate Hypothesis

- Design Intervention
- Identify Outcomes
- Conduct Intervention
- Collect, Display and Analyze Data
- Monitor the work progress

4.9 AMICS Progress Life Cycle

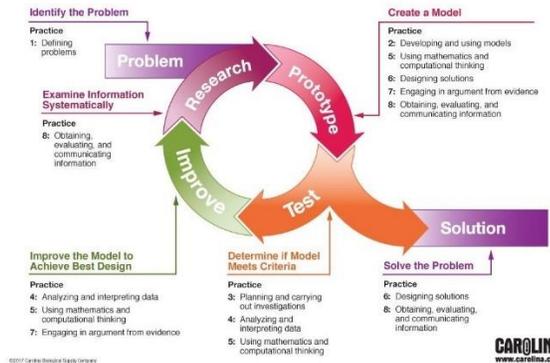


Figure 23. project Management AMICS design process
<https://dsignwesome.blogspot.com/2016/01/engineering-design-process-worksheet.html>

4.10 Focus Points and Needs

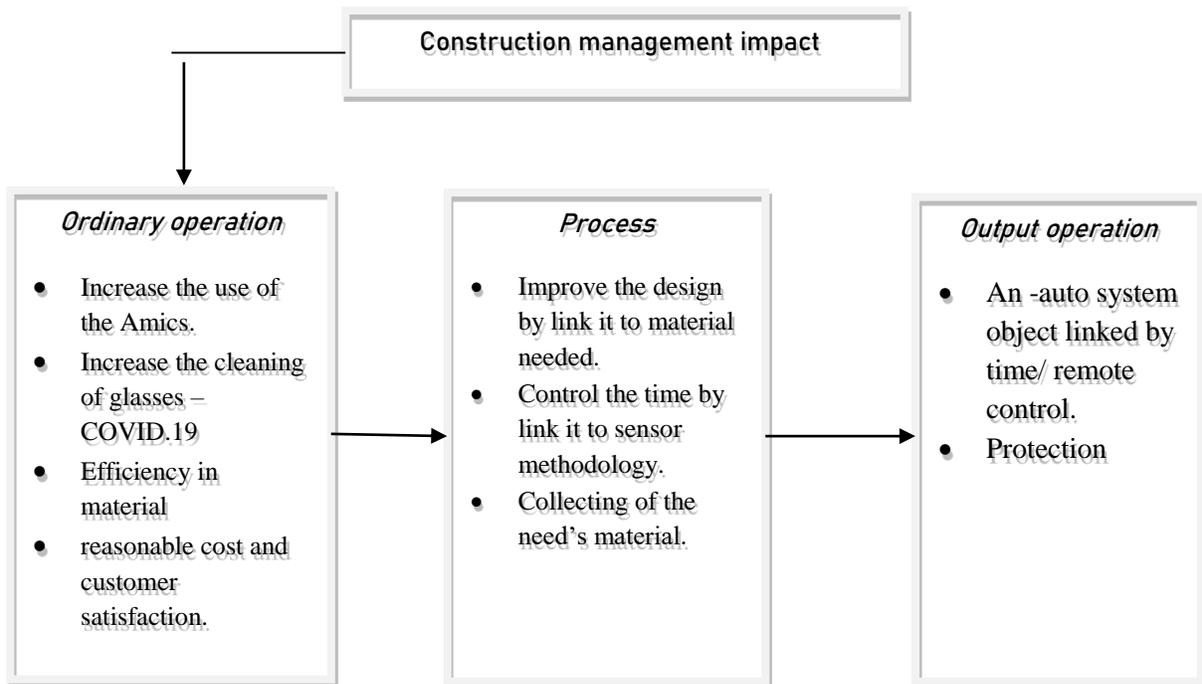


Figure 24. AMICS Focus points and Needs

4.11 Methods & Materials

The following sketches describe the concept and the materials that can be used, it also shows an elevation of how the movement of the project can be, what is the best way to determine the movement way, how the watering system can work, and the fixing method.

The sketches shows that the movement of the case product either from up to down or the opposite (from down to up) , while the best fixing methodology is the boundary either around the glass, solar panel or in the inner side the window section (ordinary glass) the materials that can be used in both cases preferable to be a high quality materials for the purpose of long term , flexible in use, and an auto sensor (automatic) to support the use of remote control and the programing system for the purpose of an easy to be used by the users.

4.12 Risk Mitigation Plan

To summarize the end results, as long as the process of creating the project is going day by day as the planning, with the present of the right manpower and the right resource, the project is considered as low risk. When the project is considered as a low risk the implementation and manufacturing of the project will be easily to handle, easy to be maintained, and it developed to have less delays.

Table 11 Focus points and Needs

Likely hood	Consequences			
	Insignificant	Minor	Moderate	Major
Risk can easily be addressed by day-to-day progress	Should not be any delays – costs up as per quality	delays as per quantity– costs up/down as per markets	delays as per quantity– costs up/down as per markets	delays as per quantity– costs up/down as per markets

Certain 90% chance	High	High	Extreme	Extreme	Extreme
Likely 50% - 90% chance	Moderate	Moderate	High	Extreme	Extreme
Moderate 10% - 50% chance	Low	Low	Moderate	High	Extreme
Unlikely 3%-10% chance	Low	Low	Low	Moderate	High
Rare Less than 3% chance	Low	Low	Low	Low	Moderate

4.13 Analysis Techniques

The technique of analysis is based on the techniques that is going to be used during the manufacturing progress and the training that must be given to the manpower, and considerations of the step by step progress and day by day , handle the estimation of risks in the early stages and avoid it , focusing on each stage separately and link between stages to reach the successful of the steps, stage, and between stages, monitor the progress of each step and control the working by time , right resources, helpful people , set the right people on the right steps, set up and ethical people supported by loyalty and respect , set people who are not working with each other for a personal purposes or self-personal purposes, set people who are not working to remove others from their jobs just because they create to themselves an unreal thoughts , support the work and people with diversity within the one organization, work with real reasons, work on high quality resources and high quality materials.

Table 12 Risk Register

Maintenance	Break down element (Natural weather) / Man made	Un-trained Manpower during the fixing process
Man made	Fall down (environmental factors)	Riots & Vandalism Sabotage
Design process	Development process	Un-trained manpower

Table 13 AMICS Justifications

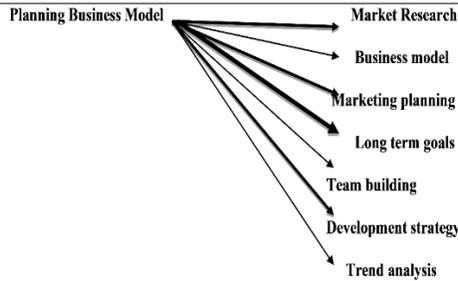
Initiation				
Project charter				
Project name:	AMICS – Auto Mechanism International Cleaning System			
DATE:	Last Revise	PROJECT	PROJECT	MANAGER:
15/5/2022	Latest Improvement	SPONSOR:	SALA ESSAM	
project stakeholders				
Project Manager	Sala essam Hussein – 20001207			
Supplier	Sensor technology and programming- such as Nova sensor			
Supplier	Remote control suppliers			
Factory	Prototype the product with the elements needed & prepare it for testing			
Customers	Either Government & Owners – or public users			
Project justification	Benefits Business			
	Reduce the governmental economic expenses reduce the yearly maintenance cost.			
The purpose of the project is to improve the product by link it with the general situation, reducing problems caused by lack in maintenance, to provide a better	Role	Status	Date	
	Executive	TBD		
	Sponsor:			
	Process Owner:	TBD		

environment impact to human health Project Manager: TBD
 specially after covid-19.

Success Criteria

Easy implement	Easy manufacturing	Easy to maintain
Clear expectations	Reasonable budget	Long-term product

Table 14 Facilities of AMICS



Natural Rubber

Long Serving Duration

Easy installation

superior visibility quieter

Recycled materials in rubber element

Easy manufacture

Reasonable price

4.14 AMICS Initiation Plan

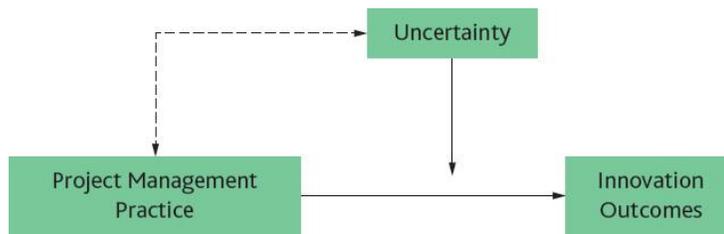


Figure 25 Initiation plan (Jetter, A., & others (2016)).

4.15 Requirements management plan

After taking the acceptance and improvements from authorities the collection of needs will be based on Service and support survey to determine the needs of human being in the present of COVID-19 and brainstorming with instructors and the people who are interested in developing the project.

Table 15 Requirements Collection

Categories: TBD

That the questionnaire be a sufficient source to know what is in the market and how much we care about the product in addition to the extent to which human development goals are achieved.

Prioritization

Electrical needs, foundation needs, output needs

Table 16 Quality Plan

Project name:		Project Manager: Sala Essam & specialist			
What		Why	When	How	Who
Characteristic	Type	Reason	Timing	Method	Owner
Not expensive	Techno	Healthier environment	Present	Manufacture	Sala Essam
Easy implement	Sustainable	Low cost for owners	Present		
Easy to maintain					
What	Status	Not Manufactured Yet			

4.16 Future Development

The propose AMICS mechanism is covering a different aspect from different point views, the better quality to the product the better end results from environmental and governmental in term of owners and other stakeholders, including the other aspects such as sustainability and technology.

CHAPTER 5. CONCLUSIONS & RECOMMENDATIONS

5.1 Conclusion

After studying the above-mentioned researchers' experiences and the new implementation in the dissertation and based on the discussion in the interviews, the expectations that were made that dust is one of the main risks in the lack of efficiency of solar energy during its operation in the places, regions, and buildings in which it is placed, the dissertation was supported by new and improved technology to support systems of governments, owners and stakeholders of solar energy and regular glass to support the new activities. It is well known that the countries of the Middle East are moving towards growth and development, largely due to the ease of public life and the facilitation of administration.

The discussions that took place during the development and processing of the new technology above help create new ways for researchers and management officials to see different ways to inform project management progress related to sustainability and technology. Project management is one of the most important sections carried out by governmental, private organizations and institutions in order to give enlightenment to the future events of a project and a reason for the success and operation of the activity to be carried out.

On the other hand, Solar power is proving to be an attractive opportunity for both business and power generation. Significant improvements have been made by many international, governmental, and non-governmental organizations, including funding and development of projects involving renewable energy systems for various developed and developing countries. This advancement is transforming uninhabitable conditions into quality living spaces and offering new luxuries to those who once lacked it. Ecosystems, developing societies and the solar market will only benefit from an increase in solar PV system installations. However, funding these systems is a challenging aspect given the wide range of needs. Fortunately, solar energy is becoming more cost-effective as more and more organizations volunteer their financial, professional, and technical services. While progress has been slow but steady over the past two decades, current efforts by industry leaders and researchers have significantly reduced costs and increased efficiency. As fossil

fuel costs continue to rise and solar prices continue to fall, the next decade will certainly see solar as a primary, integrated, cost-effective energy source that can reduce environmental impact and improve energy security.

The renewable energy sector faces clear obstacles. Some of these are inherent to every renewable technology; others are the result of distorted regulatory structures and markets. It's necessary to create a comprehensive policy and regulatory framework to implement the renewable technologies. The renewable energy market requires clear policies and legal procedures to increase investor attention. Technological deficiencies and lack of infrastructure to build renewable technologies should be overcome through R&D. It can be through focusing on implementing solutions through the manpower of agencies and the governmental funding to projects.

To achieve a reliable system, it is strongly recommended that both renewable energy and conventional sources and storage must be used in a mixed configuration of two or more resources. Regulatory authorities should develop the necessary standards and regulations for hybrid powertrains. Making investment economically possible through effective policies and tax incentives will yield social benefits beyond economic advantages. Highlighting service and maintenance of facilities and low technical reliability can reduce customers' trust in certain renewable energy technologies, hindering their choice. Sufficient skills are required to service/repair spare parts/equipment to avoid equipment failures leading to interruption of energy supply. Community awareness of renewable energy should be fostered, and consideration should be given to focusing on their sociocultural practices.

Last but not least, The dissertation is giving a clear process of what methodologies need to be used, what kind of elements have to be used, a vision to a business case of implementing AMICS, it supported the studies of other researchers, and addressing the researches gaps as well as the different of case studies, the sections and the categories in the dissertation is giving a view to the tasks and the manufacturing method for the successful of AMICS (Auto-mechanism international cleaning system).

5.2 Recommendations

The following are the recommendations from this research work:

1. toxic substances, to reduce the negative impact on the health of living organisms.
2. Improving the solutions in a practical way, to reduce the loss in costs in the research.
3. Some practical can be improved for a better developments and others serve the purpose for a long time without the need for a major change.
4. Future developments depend on imaginations and bring the imaginations into the reality, so there should be a focus on training in order to reach the success. *(H.H. Sheikh Mohammed b. R. 2022)*
5. Practical developments should be based on focusing and solving the issues more than focusing on the issues it-self.
6. Loyalty, honest, fairness and cooperation are the only way to bringing the future in to the reality.
7. Simplicity will let us reach the future with the need in focus on the simplicity details.
8. Finishing the practical's is much more important than the working hours to rise up with human health and a fast reach to future targets.
9. The Auto Mechanism Self-cleaning system can be shaped in different ways based on the human needs as well as on the building shape.
10. The issues never with the nature its always with the way and the purpose of using the nature.
11. Implementation of auto mechanism self-cleaning system can be during the execution phase of the project.
12. Implementation of the auto-mechanism self-cleaning system can be implemented after closing the project.
13. Auto-mechanism self-cleaning system can work on different directions.
14. The result of an excellent product depends on a high-quality material.

15. The closer the wiper rubber to the glass is, the better result of cleaning will reach.

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APPENDIX 1 QUESTIONNAIRES

1. How many times does we clean the exterior surface of the building we live in?

- Solar panels
- Ordinary glass
- After using AMICS

2. Do we have time to clean the ordinary glass/ solar panels in our daily life?

- Solar panels
- Ordinary glass
- After using AMICS

3. How many times do we clean the photovoltaic panels/ ordinary glass?

- Solar panels
- Ordinary glass
- After using AMICS

4. Does the use of Auto-cleaning system can help in developing the environmental impact of our world?

- Solar panels
- Ordinary glass
- After using AMICS

<p>5. How the users compare in human health outcomes after the use of the auto-mechanism cleaning technology system?</p> <ul style="list-style-type: none">○ Solar panels○ Ordinary glass○ After using AMICS
<p>6. Do you think, the use of Auto-mechanism self-cleaning System increase the efficiency of saving energy?</p> <ul style="list-style-type: none">○ Solar panels○ Ordinary glass○ After using AMICS
<p>7. Based on your experience, till what percentage, the efficiency of using self-cleaning Auto mechanism system can increase?</p> <ul style="list-style-type: none">○ Solar panels○ Ordinary glass○ After using AMICS
<p>8. Till what level have the modern services affect positively the human attitude?</p> <ul style="list-style-type: none">○ Solar panels○ Ordinary glass○ After using AMICS
<p>9. Does the auto-cleaning system improve the governmental economic impact, positively?</p> <ul style="list-style-type: none">○ Solar panels

- Ordinary glass
- After using AMICS

10. Does the auto cleaning system provide a clean exterior environment which will improve the human health?

- Solar panels
- Ordinary glass
- After using AMICS

APPENDIX 2 – Questionnaire Responds

<i>Interview 1</i>	Solar Panels	Ordinary Panels	
How many times does we clean the exterior surface of the building we live in?	Through cleaning service companies, 6 times a year		
Do we have time to clean the ordinary glass/ solar panels in our daily life?		NO	
How many times do we clean the photovoltaic panels/ ordinary glass?		once every 2 months	
Does the use of Auto-cleaning system can help in developing the environmental impact of our world?	I have to try it in order to determine & improvement of its success.		
How the users compare in human health outcomes after the use of the auto-mechanism cleaning technology system?	Our health is already affected, but there is no doubt the product can improve the human health outcome		
Do you think, the use of Auto-mechanism self-cleaning System increase the efficiency of saving energy?	If its properly fixed and the product elements was based on a proper study, then it will increase the efficiency of the panels		
Based on your experience, till what percentage, the efficiency of using self-cleaning Auto mechanism system can increase?	It's difficult to determine without using the product		
Till what level have the modern services affect positively the human attitude?	Depends on the acceptance level of welcoming and supporting new ideas		
Does the auto-cleaning system improve the governmental economic impact, positively?	To be honest yes it will improve the economic impact also it will reduce the Amounts spent on cleaning services		
Does the auto cleaning system provide a clean exterior environment which will improve the human health?	Yes, it does, but still, I have to try the product		
Interview 2			
	Solar Panels	Ordinary Panels	P/N
1) How many times does we clean the exterior surface of the building we live in?		Where do I live, twice in a year	

2) Do we have time to clean the ordinary glass/ solar panels in our daily life?		We don't because of daily work routine, you are tired, there is nothing to think about	
3) Does the use of Auto-cleaning system can help in developing the environmental impact of our world?	Yes, it works as long as it will set correctly		
4) How the users compare in human health outcomes after the use of the auto-mechanism cleaning technology system?	Supporting it will serve human health		
5) Do you think, the use of Auto-mechanism self-cleaning System increase the efficiency of saving energy?	Yes, if its set in a way to increase the efficiency of saving energy		
6) Based on your experience, till what percentage, the efficiency of using self-cleaning Auto mechanism system can increase?	If the product is used and set up well it can increase, it by 80%		
7) Till what level have the modern services affect positively the human attitude?	It can as long as there are aims to do		
8) Does the auto-cleaning system improve the governmental economic impact, positively?	It will reduce the spending of governmental money		
9) Does the auto cleaning system provide a clean exterior environment and improve the human health?	Yes, as long as the product will be implemented in the exterior facades of buildings.		

Interview 5

Interviewee 2:

What is your main finding? Is it a cleaning procedure, cleaning material, cleaning strategy or it is design that is easy to clean?

Interviewee 1:

basically, it's a group of all what it is mentioned, including a cleaning-product which I believe it should be manufactured widely and implemented everywhere. I named it auto-mechanism self-cleaning system.

Interviewee 1:

I will start immediately with the interview questions, and during that I will explain about the auto-mechanism self-cleaning system.

Interviewee 2:

ok

Interviewee 1:

How many times does we clean the exterior surface of the building we live in?

Interviewee 2:

I usually don't know but I think they usually do it once or twice a year.

Interviewee 1:

Do we have time to clean the ordinary glass/ solar panels in our daily life?

Interviewee 2:

again, if you are talking about someone who is living in an apartment or a villa usually, they don't do this, they usually ask someone who is hired to do this, and in solar panels it has to be something different because it's having a special arrangement and required more cleaning sequence than regular building.

Interviewee 1:

how many times do we clean the solar panels per year?

Interviewee 2:

It depends on the followed cleaning strategy, most people will do it on regular bases like every month, some people will say every two months, some people will say every two weeks, some people will do it as needed, you look at the perfection of the panels and once it reaches a certain value you clean it so this going to happen within a week to two months.

Interviewee 1:

so, it depends on the condition of the solar panels in this case?

Interviewee 2:

It depends on both, the condition of the solar panels this if it done based on performance base cleaning and on the period cleaning, in which we clean every month, but this does not guarantee the performance of the panels.

Interviewee 1:

A study happens in Saudi Arabia, I think it was between them and a group of British people, the study was in the circle of solar panels, and because the dust and the sandy environment that the middle east have, the reduction of solar panels efficiency in percentage its around 50% to 60%, in this case the solar doesn't observe and save enough energy from the sun x-rays.

Interviewee 2:

There is a lot of work on this area, it depends on the rate of rain, some areas it depends totally on rains to clean the panels, while in some other areas rain might cause an issue through resulting a dust after it dry, and it is not the same everywhere it depends also on the local conditions. You need to classify different cleaning strategies in different countries, and then decide about the system, the location you are working in, the most suitable strategies.

Interviewee 1:

from strategic point view for the case of solar panels it's important to implement the solar panels in the right location in which will observe the maximum percentage of the x-rays, the second thing is the direction of the solar panel should go in parallel with the direction of the sun which mean whenever the sun come and go also the solar panel should automatically go with it and wherever the higher x-ray percentage.

Interviewee 2:

The x-rays, and extracting the sun, the solar maps, the locations which have highest solar radiation, the locations which has lowest solar radiations, all these well-known and well documented.

Interviewee 1:

Does the use of Auto-cleaning system can help in developing the environmental impact of our world?

Interviewee 2:

It depends, specially such a country in United Arab Emirates how the use of water and what type of water you are going to use, is it treated water or practice water?

Interviewee 1:

It is a water that will be recycled in building, because I believe this is the best way to implement the product and the product treatment successfully in order to reach the successful to clean the glasses with the ordinary glass which we use mostly, or the solar panels which I believe it's expensive, and from this point view I have to consider the water strategic system that I have to follow in order to implement it in the right way and as it should be.

I believe the water recycling strategy that I have to use, is the recycling system that will serve only the this type of the building , which mean it is not at all the recycling system that you are taking it from the used water from toilet or kitchen or even from the water that we use in our daily life and then you implement it in treating the grass, parks, landscape because that will cause disease that's why I cannot go through that direction, the recycling system am talking about it's a new strategy that we should implement in order to serve the cleaning of this part of the building (glass buildings, ordinary glass, solar panels) and the implementation of brushing product to clean the solid part of the building.

Interviewee 1:

you have to be worried about the piping system, potential bacterial approach, even if you are going to use the water to clean the glass it can cause a wellness to people around it, there is a minimum level of cleaning that you need to do to treat the water before it cleans, even if it is just for cleaning practice. If you are going to recycle the water if the water has organics from bathrooms, toilet, extra... there could be bacterial, and microbes in the water, if you used this water in the surfaces the bacteria will be there in the surfaces, the product, etc.

Interviewee 2:

100%, but I don't want to use the product to clean the glass and then I recycle the water from the kitchen and toilets used water to use it in cleaning the glass to bring wellness to people, this is unacceptable strategy to work on it, what I mean let's consider we are implementing totally 100% new pipes, linked with a new water tank filled by 100% cleaned water, just to serve the water system and the auto-mechanism self-cleaning system product, which will clean the glasses (ordinary and solar) through a remote control and a sensor system and then during the cleaning process there is a water mixed with dust (after cleaning) it will go to another water tank, which will add on it a filter system, in order to clean the used water and re-cycled the same water to clean the building glasses but I can guarantee the recycled filtered water it's still the only water that we used to clean the glass at the first stage. And because of the remote-control system the users will have the freedom to clean the panels whenever they believe that the glass needs to be clean, because the programming of the product is mainly built to work daily, weekly, monthly, yearly, it's up to users.

Interviewer 1:

what will you do with the water that will be lost during the cleaning system? Because you can't guarantee that the used water will be recycled 100% which mean you will need to collect additional water to have enough water for repeating, you need to do analysis of how much water you can collect from rain, I don't think the rain water will be enough, also you need to consider the cost of the cleaning, wither it is filtration, equipment, electricity, you should have enough pumps , so there are other cost you need to consider during the system itself.

Interviewer 2:

I think this is a gap I have to look at it,

Interviewer 1:

You have to consider the maintenance of the cleaning product itself

Interviewer 2:

The product designed in a way to not have a maintenance at all, it's just a matter of changing the rubber yearly, and it should not cost too much money. Added: programing the technology inside the product that what will require maintenance.

Interviewer 2:

when we clean the glass of the car, does the water go outside (to the floor)?

Interviewer 1:

true, to the floor

Interviewer 2:

which mean the water go in to one direction, only around 10 to 20% the water fly, and rest of the 80% it goes to the floor, which mean we still have a good percentage to save as much as we can from water to clean the glasses for the case of cleaning the buildings.

Interviewer 1:

when you clean a car the surface area distance it is limited and short, in this case the time for evaporation is also short, while in a tower the water falls from the top to the bottom you might not have any water left, especially if there is a lot of water evaporated because of the temperature and humidity.

Interviewer 2:

In this case It depends on the water direction as well as the percentage of the water pressure and this strategy it should be well programed to reach it successful

Interviewer 1:

This thing you will have to assist, stimulate, to see how the system will work at this stage, having this height, and temperature to know how much water will be left how much water will be observed how much water will be saved and how much water will be used, and so on, you have to show this in numbers, because in this rate the evaporation will change depending on the outside temperature, outside air, outside humidity even the direction of the glass, in which the glass in the north doesn't see direct sunlight , the water on the north side will be more.

Interviewer 2:

Till what level have the modern services affect positively the human attitude?

Interviewer 1:

It will make life easier, usually if they find something which will make their life easier, they will be happy to use it.

Interviewer 2:

Does the auto-cleaning system improve the governmental economic impact, positively?

Interviewer 1:

this thing will not have an impact on the government this thing will have an impact on the owner of the government

Interviewer 2:

is that mean the government they don't have buildings?

Interviewer 1:

that's something else, you think of them as an owner not as a government

Interviewer 2:

government is considered as a group of people they owned a building and a governmental direction

Interviewer 1:

saving will be good for large buildings; they might not be certificate for small buildings			
Interviewer 2:			
Does the auto cleaning system provide a clean exterior environment and improve the human health?			
Interviewer 1:			
it depends on how well it works; it will not have an impact on health			
Interviewer 2:			
how well it works it depends on the quality of the product and the elements used, also if it's improved to be manufactured, the manufacturing in this case should be mechanized well, supported by a well-trained manpower who are able to catch the ideas immediately without taking too much time on explanation.			
Interviewer 1:			
in this case you will spend some cost in training people			
Interviewer 2:			
more than the cost, I think it depends on the number of people that we need to reach the successful of the product , also they have to be well trained during the installation of the product element's , and the product elements it's not a difficult elements that we need to create from nothing, it's all exists with a very good prices, it's just a matter of grouping and implementing as well as fixing, and end by having a new product that is not exist yet.			
Interview 4	Solar Panels	Ordinary Panels	When applying the product
1) How many times does we clean the exterior surface of the building we live in?	At least once a year	Twice a year	
2) Do we have time to clean the ordinary glass/ solar panels in our daily life?	No	No	
3) How many times do we clean the photovoltaic panels/ ordinary glass?	TWO	Two to three times	
4) Does the use of Auto-cleaning system can help in developing the environmental impact of our world?	YES	Definitely, YES	
5) How the users compare in human health outcomes after the use of the auto-mechanism cleaning technology system?	No response	No response	

6) Do you think, the use of Auto-mechanism self-cleaning System increase the efficiency of saving energy?	YES	NO	
7) 7. Based on your experience, till what percentage, the efficiency of using self-cleaning Auto mechanism system can increase?	-	no response	Around +40 to +45%
8) Till what level have the modern services affect positively the human attitude?	No response	70%	
9) Does the auto-cleaning system improve the governmental economic impact, positively?	Yes	Yes	
10) Does the auto cleaning system provide a clean exterior environment and improve the human health?	YES	Yes	