

Nanotechnology Should Be Implemented In Today's Society

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Abstract

This report is generated for the innovation, industry and research departments. The project will depict a scoping analysis of currently available socio-economic impacts of nanotechnologies. It will also explore areas of conflict and consensus in the available literature. In persuasion to the tender request, the major purpose of the report is to provide an analysis of the economic and social impacts of nanotechnologies. It is not only an assessment of the nanotechnology issue but also the appropriateness of nanotechnology in the current society and particular Responses from different personnel. This paper presents the findings of the analysis.

The scoping analysis encompasses the social science and non-academic literature in the society domain. It is hence significant to ascertain that while the literature dealing with the socio-economic impacts of nanotechnology is defined by multiple opinions, the literature inclines to focus on the potential and perceived risks of excluding the potential benefits posed by nanotechnology. Contemporary, the project will be dominated by discussing and setting forth the potential benefits and impacts linked to the implementation of nanotechnologies in the society framework.

In addition, the report will also explore the other research carried out by other individuals and researchers. It will also analyze the contributions from other research technology agencies, including academic and societal actors, and the results generated from the research. In this regard, the specific and contributing research on the present, future and economic dimensions of nanotechnology based on a local perspective will be fully explored. This would be in addition to the particular risks, opportunities, and challenges that nanotechnologies pose for society as a whole. In this essence, there would be considerable scope for the establishment and application of nanotechnologies in the current ever-transforming society.

Background

In 2006, a report carried out by the National Nanotechnology Strategy Taskforce showed that nanotechnologies had the ability to change how people lived. It also depicted that nanotechnologies had the ability to change the healthcare, manufacturing, electronics, manufacturing, energy, communications and agribusiness industries. Moreover, NT has the capacity to initiate new and advanced manufacturing systems, new drug delivery mechanisms and systems, cleaner and reliable energy systems, clean water, new materials and advanced computing devices.

Nanotechnologies are considered to hold a large potential in terms of competitive and economic benefits for both environmental and human benefits. Kunz and Theodore (2005) argue that nanotechnology would be the second coming of the industrial revolution. Moreover, Hull Man (2006) proposed that nanotechnology would be significant in overall economic development. He also argued that NT is bound to induce the introduction of electronic, communication, information and automobile technologies. Thus, nanotechnology has the potential to positively impact almost all sectors of the economy, especially nanotechnology applications, which can be widely applicable in every sector.

Nanotechnology has already been established in the marketplace. In relevance to an online inventory of nanotechnology-related consumer goods, there are a lot of processed goods based on the nanotechnology procedures within the marketplace that have been proven considerable and effective. Nanotech production and manufacturing processes and techniques have been incorporated into the market and industry setting as they are considered to be faster, easier and wholly effective. In this regard, nanotechnology is bound to be adopted and incorporated widely in the market setting.

Literature Review

Nanoparticles are grouped into three groups, which include natural, anthropogenic and artificial or man-made categories. The natural nanoparticles are located in natural sources such as forest fires and volcano eruptions which release a nanomaterial referred to as Bucky balls. The anthropogenic refers to the bi-products of copper and welding material, which are mostly found in waste heat boilers. The man-made nanomaterial is deliberately released because it has technologically favorable features.

The nanotechnology application has become popular in the huge global business market. In this essence, a lot of investors have invested in nanotechnology, most of them generating huge profits. Moreover, the product value of using nanotechnology is expected to rise in huge amounts in the next proceeding generations. In another varied study, it was found that wall paints encompass polyacrylate and silica nanoparticles, which aids in reducing petroleum costs and environmental pollution. On top of that, more researchers backed up that the plant was environmentally safe and resistant to fire.

In addition. In regard to various literature, nanotechnology is significant in improving human health. One of the major benefits of nanotechnology in the health setting is that it leads to the improvisation of new and advanced medical treatments due to the fact that nanoparticles can be easily passed through cellular cells and membranes. This, in turn, allows the transfer of medicines into the sick cells and fosters less damage to the adjacent healthy cells, hence making them more effective than other conventional procedures. On the other hand, nanotechnology is also applicable in treating cancer. This is relevant to the increased vascular permeability and the impairment of the lymphatic in cancer tumors, which enables increased permeability and retaining effects of the Nanosystems with the tissues inflicted by cancer tumors. In general. The Nano-engineering of medicinal drugs allows the effective functioning of drugs being administered in the body tissue due to its unique features of

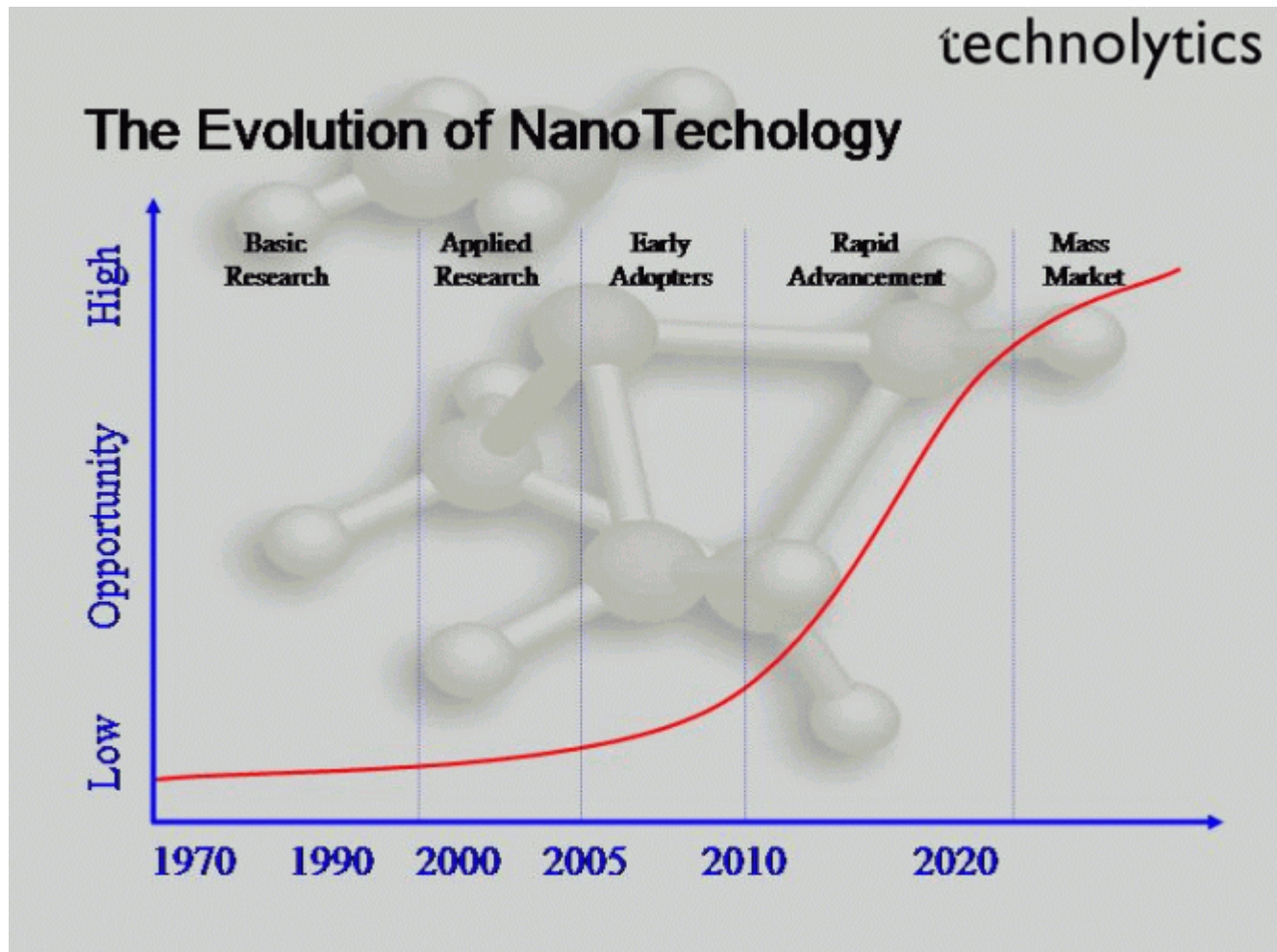
stimuli sensitivity and tissue traceability.

Another additional promising application of nanotechnology in the health setting is in the treatment of neurological and nervous disorders. The therapeutic value of treating such disorders is impaired by the availability of a blood-brain membrane barrier, which hinders therapeutic procedures. During such conditions, nanotechnology offers a better drug permeability which helps in counteracting the barrier hindrance. NT has also shown great potential in improving the bone healing process, which totally benefits people suffering from bone problems. In bone healing, nanotechnology sets forth biomaterial systems that are linked with the Nanoscale network, which in turn enables the extensive and open flow of body fluid through openings that trigger the growth of bones. The NT has also played major roles in other medical fields, such as cardiac therapy, gene delivery, imaging, and orthopedic applications, as well as in dental care.

Preliminary Data

According to various researchers and reviews, there is a range of terminology available to describe approaches to nanotechnology. Most of them reflect differences in nanomaterial, their significance and their benefits in different settings. In light of these reviews, the report constitutes a scoping study, methods involved in the relevant field, as well as various database sources essential in literature collection. Following the collection of literature ascertained to be relevant, a preliminary analysis of the literature review will be carried out. This would involve reading and analyzing all the obtained documents and providing notes on the social and economic effects of allowing the use of nanotechnologies. A set of key themes would be developed in inclusion of surveillance, privacy, communication and regulatory issues involved. In this sense, 'charts' representing the range of perspectives will also be developed within the literature of the key themes bound to be developed. Each chart would serve as a helping ground for the society and project team.

Currently, the evolution of Nanotechnology is heading towards its climax, as estimated by Technolytics (2017). As a result, this data will be used as a supportive argument for the implementation of nanotechnology in a societal context. Extensive research programs have been incorporated to define and establish safer ways of using nanotechnology products in everyday life.



Source; (Clare, 2017)

Based on StatNano statistics, some countries have already embarked on the application of nanotechnology articles, of which China has a 34% share and is seconded by the USA with 16%. This ranking indicates that portions of the world population are reaping the benefits of nanotechnology, although its application is yet to be widespread. As indicated in the chart below, the implementation of nanotechnology is achievable, and hence, the incorporation of nanotechnology is essential in every society.

Rank	Country	Nano-articles	Share (%)
1	China	47,455	34.51
2	USA	22,337	16.25
3	India	11,066	8.05

4	South Korea	8,386	6.1
5	Germany	7,963	5.79
6	Iran	7,583	5.52
7	Japan	6,952	5.06
8	France	5,313	3.86
9	UK	5,038	3.66

Review Aims

This review would provide a report which would critically examine the literature on the economic and social impacts of nanotechnology. The core focus of the report is in relevance to the United States context, as well as the secondary focus in relation to international literature. The aims of the review and project would be on the basis of defining the appropriateness and the potential benefits posed by the introduction of nanotechnology in modern society. The research team would incorporate social scientists, researchers, business groups, non-government organizations and other willing parties.

The project also aims to provide a detailed response and account for the areas of contention within the literature. The specific deliverables would incorporate the description of the proposed methodology purposely for the conduction of the review, a report which provides a critical examination of the available literature on the social-economic effects of nanotechnology and finally, a detailed analysis and account of the current trends and conclusions generated from the topic.

Research Questions

- In relevance to the existing data and responses, what are the possible future social and economic implications of nanotechnology in society?
- How may the NT implications be defined in light of the international literature?
- What are the areas of consensus?
- What are the gaps in the existing literature?
- What are the areas of consensus?
- What part of the society will benefit the most?
- What are the areas of conflict?

Design of Experiments

In reference to the application and analysis of nanotechnology products, several experimental methods and designs will be utilized in order to establish several properties of nanotechnology products, their impacts and application and as well their outputs based on statistical techniques (Dasgupta et al. (2008). In this proposal, several designs have been established to explore the relationship between nanoproducts in a societal context. Non-regular designs, response surface methodologies as well and regular designs will be effectively used to investigate nanoproperty properties, which dictate their application to society. This proposal section will provide parameter designs in nanotechnology as well as specific examples of how to utilize nanotechnology products in a safer way.

Regular Designs

Basumallick et al. (2003) performed an investigation on the synthesis processes for Co-SiO₂ and Ni-SiO₂ nanocomposites, through which sensitive process parameters are, used to determine the physical properties of nanocompounds. In this process, the impacts of nanocomposite properties are based on three factors in its experimentation. Basumallick et al. utilized a two-level full factorial design, which added three runs setting. This design set all factors of nanotechnology properties at the middle level and hence the reliability of the design for the final project. Using regression equations, the outcomes of the experiment are subjected to fractional conversion values through which the composite concentration of the nano compounds are known and categorized towards their usefulness in society.

In regards to the complex response of this design, the improvement of methods of data collection and analysis will be considered through the application of extensions of experimental designs, which are commonly used in computer-guided experiments and are effective in data collection in a cost-saving model. Subsequently, robust process-optimization ideas, which are less sensitive, can be incorporated further in order to minimize the noise factors (Taguchi (1986).

Lin et al. (2003) provide an example of this design in which he examined copper lead frame on the surface and grain structure of silver-plated film. Atomic Force Microscopy was used to measure the surface thickness and UMIS-2000 nanoindenter was used to measure the surface thickness based on nanoindentation measurement. Comparatively, a transmission electron microscope was used to examine the grain structure. The characteristics and the application of the silver-plated film surface and as well its grain structure ascertained that the quality of wedge bonding of silver-plated lead frame and gold wire can be experimented with based on a factorial design. The Response Surface Methodology will be considered in reference to identifying complex models and properties that characterize the nanomanufacturing process of different nanocompounds, and as well it will also be utilized for data collection.

In reference to this experimental design, the project will establish the comprising ingredients and properties incorporated within nanoparticles. For instance, through this method, Lin et al. (2003) defined the composites that are formed by within nanoparticles are now used for drug delivery systems for commercial purposes.

Non Regular Designs

Non-regular designs are considered for the nano process in the event that the regular factorial design is not feasible as a result of experimental limitations in reference to factor-level selections and size. D-optimal designs are successful applications that are widely used by researchers to evaluate the concept of technology. In comparison to regular designs, D-Optimal methods use non-orthogonal design matrices in the reduction of experimental runs and as well in minimizing the variances of coefficients which are widely attributed to settings of specific models. The observations derived from properties of composites based on this methodology provide an overview of the mechanical and physical properties of the nanocompounds (Fasulo et al. 2004). For the purpose of the report, A D-optimal design will be adopted in the process of research in which it characterizes the relationship between the explanatory factors and quality measures.

Robust Parameter Design

The major challenge of using Nano synthesis is the wide range of variation in the experimental results. Most processes involving the Nano synthesis are highly sensitive to the environmental and noise factors. In this essence, robust parameter design applications are widely considered by various researchers to aid in the reduction of experimental variations and improve the process output and efficiency of the production process. The application largely relies on the different control factors with the inclusion of the noise factors after linking the nose and the factors in the control of the experiment.

Nevertheless, nanoparticles have been widely used in several industrial applications which include Nanoceramics, Nano compound and nanotube materials. Recently, a new milling machine has been improvised to ensure the effective production of nanoparticles in order to refrain from the aggregation effect. In relevance to its simplicity and applicability to all the material materials, the nanotechnology machine has become very popular. In optimizing the nanoparticle milling process, the following factors are taken into consideration: the overall time taken, the flow velocity, solvent weight, filling ratio and the rotation velocity.

Data Collection, Statistical Analysis, and

Physical–Chemical–Statistical Modeling

Since nanotechnology experiments are characterized by complicated data patterns, the modeling, the analysis and the collection of data of different nanotechnology aspects, this section will incorporate several data analysis and collection tools which focus on spatial data in nanotechnology studies. Additionally, probability models and quantitative and qualitative models are reviewed in reference to the analysis of data obtained from the preliminary data section.

Sampling Plans

Strategic sampling procedures are critical in defining the nanotechnology application in a social context using less data. Based on this criterion, several sampling techniques are utilized in selecting representative data for purposes of analysis. These techniques include systematic sampling, stratified sampling, random sampling, and importance sampling. The named techniques will be instrumental in establishing, collecting and analyzing data for the purpose of supporting the project topic. In reference to this, the data obtained from the preliminary section and from the experimental designs will be obtained.

Alternative Methods

As a result of the proportion of huge margins involved in nanotechnology, which are not well explained by the established data analysis models, stochastic modeling techniques will set up a characterizing process that incorporates basic terms and relevant information in terms of the analysis of nanotechnology implementation in society. Subsequently, in order to understand the randomness of material distribution in properties of nanoproducts and their corresponding application. Also, using interviews and questionnaire in order to establish and find supporting facts on the implementation of nanotechnology.

Limitations

Choosing the desired experimental design methods

In the case of various applications, full factorial designs can be sufficient in modeling, understanding and process building. However, as depicted in various examples, non-fabrication processes are very sensitive to changes in control factors. In addition, the overall outcome can only contain random variables. Hence, in this case, new experimental designs can be put into consideration. Ultimately, other special and experimental constraints in regard to physical limitations can hinder or limit the utilization of the Nanotechnological designs and processes.

Difficulties in the Analysis of Experimental Data

Constraints may arise during data analysis Due to the demand for advanced measurement tools, spatial data, high-frequency signals and qualitative measures, which are greatly needed in nanotechnology research. The combination of Nano-device and fabrication processes, as well as statistical analysis, fosters complications in addition to the large size of data being analyzed. Subsequently, new and advanced algorithms, such as those developed by Jeong et al. (2006), Yuan and Kuo (2006), and Wang and Tsung (2007), Can be largely significant in the analysis of such new and large data types, which foster experimental constraints. However, extensive research is required mostly in multilevel, multiscale and as well in multistage processes.

Nanotechnology, being a multidisciplinary subject, incorporates experts in material science, physics and statistics. Linking the statisticians and science experts poses challenges to the difference in ideologies and knowledge on the Nano research, hence making it difficult to understand the topic in question.

On the other hand, the review mostly focuses on academic literature based on social sciences rather than scientific literature. To this extent, the literature surveyed does not encompass a clear representative sample of the diverse knowledge on the Impacts of Nanotechnologies in the society framework. Moreover, there is a frequency lag in the time associated with pre-reviewed materials, which may not fully reflect the current research. This is due to the fact that the economic and social impacts of NT are frequently published as the field is constantly evolving and dynamic.

Investigation sequence outline

Stage A – Project Designing

Aligning with the primary consultative process set of research questions to support the formulated review. On the basis of the questions, the team will develop a set of major questions and concepts of nanotechnology.

Stage B – Literature Collecting

The research would begin with the systematic collection and identification of the relevant literature in regard to the research questions by the use of journals, internet search engines and databases. The search for the academic literature will also be carried out via MEDLINE, PUBMED and Web of Science abstracts. The snowball research technique will also be incorporated into the location of the suitable pieces of literature. The literature gathered through systematic searches would be, in turn, combined with the research data available. Key themes will also be developed and summarized. In this regard, the perspectives in the literature in each will also be mapped to help in the preparation of the report.

Stage C – Literature Synthesis and Data Review

Based on the embarked research on the proposal, the data collection and review will be finalized in this stage and the literature concerning the research topic will be continued based on the interim finding. During this stage, enough data will be collected and compared with data collected from stage B. Data collection will be finalized in order to pave the way for the final literature analysis and synthesis. The preliminary facts and themes that were established in Stage B will be revised and expanded. A detailed abstract and summary will be provided based on the literature developed. During the ending part of this stage, the research will consider the overarching themes and facts will be documented in order to clarify the conflicts and consensus across the developed themes. In consideration of the conclusion, this stage will identify the gaps in the already existing literature and find the basis for future research recommendations.

Stage D – Completion of the Project

A final report will be attained in this stage through which the final draft will be provided for discussion by colleagues in order to establish their views and perform some changes to the research based on their opinions, but only if the opinions are accurate and reliable in reference to the contents of the final report. After this stage, the final project report will be submitted to relevant tutors waiting for the presentation.

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