Developmental Issues and Concerns of the Environment

Opata J. O. C.
Department of Chemical, Petroleum and Gas Engineering
Federal University Otuoke, Bayelsa Sate

A b s t r a c t

The development of the environment is crucial to the self-sufficiency and overall growth of any nation or state. Without contradiction or otherwise, it is very pertinent to emphasize that there are numerous challenges every nation contends with in its quest for the success of industrialization. While there are various ideas and views on the success or otherwise of industrialization and its attainment. Hence, the intentions and activities geared towards this should not negate on the day-to-day lives of the nation. This is because, we are all are humans, development, industrialization, or not, regardless. This is why it is humans that make up a nation, state, or society and not necessarily harmful activities or incidents. This work shall review some incidents across some cities and states in Nigeria and highlight some issues of concern. The review is for 2022 incidents.

Keywords: *Development, Environment, Operational Efficiency, Interface Management, Crisis Management, Asset management*

Corresponding Author: Opata J. O. C.

Background to the Study

Development of any environment cannot take place without considering its operational efficiency. While operational efficiency is needed for effective utilization of asset management, there are bound to be issues and concerns during any interphase. Hence, there is a need for a crisis management mechanism in operational activities. Understanding the significance of interphase and crisis management will not only enhance operations but also lead to the overall development of an environment. The importance of crisis management in asset management has a lot of positive effects on its operations. This work shall discuss how crisis and interphase management influence the operations of assets with regard to market fire incidents in Nigeria.

Literature Review

Rabie (2016), states that development is basically an economic concept that has positive connotations; it involves the application of certain economic and technical measures to utilize available resources to instigate economic growth and improve people's quality of life. Gboyega (2003), explains development as an idea that embodies all attempts to improve the conditions of human existence in all ramifications. It implies improvement in the material well-being of all citizens, not just the most powerful and rich alone, in a sustainable way such that today's consumption does not imperil the future. It also demands that poverty and inequality of access to the good things of life be removed or drastically reduced. It seeks to improve personal physical security and livelihoods and expand life chances. Pearson (1992), states that development involves "an improvement—qualitative, quantitative, or both—in the use of available resources." He also asserts that development does not refer to one particular perspective on social, political and economic betterment. Instead, it is a hybrid term for a myriad of strategies adopted for socio-economic and environmental transformation from current states to desired ones. Mahmoud (1991), states, "Development has often been confused with economic growth as measured solely in terms of annual increases in per-capita income or gross national product, regardless of its distribution and the degree of people's participation in effective growth." Matowanyka (1991), notes that the development needs of a starving population must be different from those where there is sufficient nutrition. Edgar (1987), defines development as the development of people (human development) and not the development of things.

Myrdal (1974), stated that development is the movement upwards of the entire social system. Where the social system encloses, besides the economic factors, all noneconomic factors, including all forms of consumption by various groups of people, consumption provided collectively, such as educational and health facilities and levels, the distribution of power in society, and more generally, economic, social, and political stratification. Seers (1972), asserted that "development means the conditions for realization of the human personality. Its evaluation must therefore consider three linked criteria: where there has been a reduction in (1) poverty, (2) unemployment, (3) inequality." Dudley (1969), stated that development is when a country experiences a reduction or elimination of poverty, inequality, and unemployment.

Development Indicators and Indices

According to Green facts on Health and Environment, development indicators are usually a numerical measure of the quality of life in a country. Hence, indicators are used to illustrate the progress of a country in meeting a range of economic, social, and environmental goals. The National Bureau of Statistics of the Federal Government of Nigeria (2017) states that human development indicators generally provide the basis for quantitative assessment of the achievements of countries in all areas of human endeavor. Thus, the Human Development Index (HDI) is a summary measure of human progress. It considers the average achievements in three basic dimensions of human development: a long and healthy life, access to knowledge, and a decent standard of living.

Wright (2016), The Environment, World Development Indicator series measures the environmental impact of human activity and development. Specifically, the series contains 15 indicators covering land use, agricultural data, freshwater data, energy usage, emissions, and urbanization, among others. Waas (2014), considers an indicator as an operational representation of a system attribute, which can be a qualitative or quantitative variable with a comparable reference level. OECD (2003), defines an indicator as "a parameter, or value derived from parameters, able to convey information or description of the state of a given phenomenon (…)." On the other hand, an index is defined as "a group of parameters which are aggregated or weighed based on indicators," while a parameter is "a measured or observed property." Meadows (1998), argues that indicators are part of the information flux used to understand the world, make decisions, and plan actions. Through them, it is possible to monitor and exert some control over complex systems which are socially relevant. Indicators arise from values and can lead to the creation of new values.

In addition, Burkey (1993) explains that development in the third world was expected to be an imitative process in which the less developed countries gradually assumed the qualities of the industrial nations by increasing gross levels of savings and investments (both internal and external, private and state) until the economy reached a take-off point into self-sustaining development. Therefore, an appropriate combination of domestic savings, international investment, and international aid would provide the fuel to drive the process through stages of growth that would ultimately bring the benefits of modernization to the entire population. Thus, in this model, political and social development would follow and be dependent upon economic growth. Even though critics argued that in many countries what was taking place was growth without development but with increasing poverty, which in the 1980s led to negative growth and the debt crisis.

While Seers (1972) argued that development should be seen as progress towards complex goals such as the elimination of poverty, the provision of employment, the reduction of inequality, and the guarantee of human rights. Subsequently, this changed definition had sub-definitions such as redistribution with growth, the basic needs approach, and integrated rural development. York (2010) The term 'development intervention' is used in the Standards as a general term for any activity, project, programme, strategy, policy, theme, sector, instrument, modality, institutional performance, etc., aimed at promoting development.

European University Institute (2024), World Development Indicators provides measures of social progress, quality of life, economic development, physical infrastructure, environment, and government performance. Hence, World Development Indicators is a database of global economic conditions across six dimensions: World View, People, Environment, Economy, States and Markets, and Global Linkages. In addition, the OECD has defined six evaluation criteria: relevance, coherence, effectiveness, efficiency, impact, and sustainability, and two principles for their use. These criteria provide a normative framework used to determine the merit or worth of a development intervention (policy, strategy, programme, project, or activity). They serve as the basis upon which evaluative judgments are made.

Buongiorno (2023), A comprehensive definition of environment describes it as the set of conditions in which living takes place: it is the complex system of physical, chemical, and biological factors, of living and non-living elements, and of the relationships in which all the organisms that inhabit the planet are immersed. While we can envision many types of environments, the term is commonly used in relation to nature, the so-called natural environment. Kumar (2018), Environment meaning relates to surroundings, but obviously that is a concept which is relatable to whatever object it is that is surrounded. While it can be viewed as a polycentric and multifaceted problem affecting human existence.

Jagran (2016), Environment can be defined as the surroundings or conditions in which a person, animal, or plant lives or operates. The term "environment" refers to all elements of the physical and biological world, as well as the interactions between them. The environment plays a pre-eminent role in the life cycle of human beings, as human life is highly dependent on the environment. The environment has productive value and aesthetic/recreational value, which has been explained later on under the paragraph of "What Environment does for us."

Han (2012), explains that the environment has different meanings in different disciplines. Thus, in environmental engineering, the environment is where we live, which can be divided into two types, namely the natural environment and the built environment. The natural environment encompasses all living and non-living things in the area. The built environment refers to man-made surroundings that provide the setting for human activity, such as buildings, parks, cities, and supporting infrastructures like transport, water supply, and energy supply. In addition, it is explained that there are four spheres on Earth that are of interest to environmental engineering. When combined, they can be referred to as the ecosphere and can be remembered to easily correspond to rocks, water, air, and life.

The U.K. Environment Protection Act (1990) defines "Environment" as consisting of all or any of the following media, namely: air, water, and land; and the medium of air includes the air within buildings and the air within other natural or man-made structures above or below ground. While the Indian Environment Protection Act (1986) defines "Environment" as including water, air, and land, and the inter-relationship that exists among and between water, air, land, human beings, other living creatures, plants, micro-organisms, and property. In addition, the above definitions make it clear that environment is the sum total of all external conditions and influences on the development cycle of biotic elements the earth surface. It is a

polycentric and multi-faceted phenomenon affecting the human existence and one can understand it better in relation to eco-system, ecology and biosphere.

Basic Components of Environment

Kumar (2018) further explained that the basic components of the environment consist of plants and animals, including human beings. These components may broadly be placed into two categories.

1. **Abiotic components**: They consist of the following:
   i. Climatic elements including sun, energy, temperature, air, light, humidity, rain, etc.
   ii. Isographic elements such as huge mountains, slopes, etc.
   iii. Water-resource elements which include seas, lakes, ponds, rivers, underground water, etc.
   iv. Soil elements.
   v. Mines, rocks, and underground minerals.
   vi. Geographical elements which include trans-regional parts of the Earth, shores, deserts, mountainous regions, forest land, etc.

2. **Biotic Components**: Biotic elements consist of living beings, trees, plants, micro-organisms, birds, flora, and fauna, etc.

Sewak (2022), The use of convenient hardware and limited utilization of vitality has empowered greater operational efficiency in agrarian sectors. In this context, the operational proficiency of data and technology has often been hard to demonstrate. Hence, the use of IoT has resolved all the current challenging scenarios in farming and improved operational efficiency. Macaulay (2017), Operational efficiency means that by virtue of the IoT, goods or services are created or delivered faster, cheaper, better, fresher, with fewer defects, and so on. Operational efficiency gains may be so great for a given IoT application or system that this is the only requirement and justification for investment; however, user satisfaction is always important. Jin (2003), operational efficiency focuses on the improvement in internal customer performance and is measured in terms of flexibility, consistency, productivity, and cycle time. The flexibility of a business process is defined as the adjustability to meet immediate and/or long-term customer needs as business conditions change.

NASA (2023), interface management is a process to assist in controlling product development when efforts are divided among parties (e.g., government, contractors, geographically diverse technical teams, etc.) and/or to define and maintain compliance among the products that should interoperate. The basic tasks that need to be established involve the management of internal and external interfaces of the various levels of products and operator tasks to support product integration. These basic tasks are as follows:
1. Define interfaces;
2. Identify the characteristics of the interfaces (physical, electrical, mechanical, human, etc.);
3. Ensure interface compatibility at all defined interfaces by using a process documented and approved by the project;

4. Strictly control all of the interface processes during design, construction, operation, etc.;
5. Identify lower level products to be assembled and integrated (from the Product Transition Process);
6. Identify assembly drawings or other documentation that show the complete configuration of the product being integrated, a parts list, and any assembly instructions (e.g., torque requirements for fasteners);
7. Identify end-product, design-definition-specified requirements (specifications), and configuration documentation for the applicable work breakdown structure model, including interface specifications, in the form appropriate to satisfy the product life cycle phase success criteria (from the Configuration Management Process); and
8. Identify product integration-enabling products (from existing resources or the Product Transition Process for enabling product realization).

Ascertra (2024). At a high level, interface management is the process of managing complex interface dependencies between contracting parties, delivery teams, and even internal business units. Interface management is performed in a structured, accountable manner through information sharing, collaboration, and stewardship. Although it may sound simple, depending on the size of your engineering and construction project, interface management can quickly become overwhelming without the right processes and tools in place. Interface management is a framework that formalizes communications and collaboration at interfaces and includes people, processes, and tools. All of these works together to mitigate the risk created by complex interfaces and resulting interdependencies.

Interface management is a risk mitigation tool used to formally align interfacing parties, raise awareness of interface issues, and keep teams aligned. Interface management helps project teams:
   i.   Improve the predictability of managing interfaces,
   ii. Improve alignment between interface parties,
   iii. Reduce project risks, issues, and conflicts.

Interface management achieves this by providing a common framework for identifying interfaces, eliminating ambiguity on roles and responsibilities, and facilitating the necessary communication and collaboration related to these project interfaces. As capital projects grow in scope and complexity, there is an increasing demand to control interface-related issues and costs.

Bullock (2018) states that crisis management is a proactive management effort to avoid crises and the creation of a strategy that minimizes the adverse impacts of a crisis on the organization when it cannot be prevented. Effective crisis management requires a solid understanding of the organization, its strategy, liabilities, stakeholders, and legal framework, combined with advanced communication, leadership, and decision-making skills to lead the organization through the crisis while minimizing potential loss. Fischer (2013) states that crisis management is the process of managing events of a crisis to a condition of stability.

Crisis management is not incident management. Emergency response personnel at the scene of an incident manage the incident. If the incident escalates, becoming a crisis, it is then necessary to have a different group take charge. Ideally, a crisis management team, or CMT, consisting of experienced personnel from multiple disciplines, would come together to manage the incidents that develop beyond the capability and decision-making authority of emergency response personnel. Essentially, the CMT manages the crisis to closure.

Croner-I (2024), Asset management decisions enable "the implementation of a risk-based, information-driven planning and decision-making process." This, in turn, can ensure organizational objectives on safety are integrated into asset management plans. Andales (2024), An asset management system is a process used by companies and organizations to monitor and manage their assets. It consists of tools, techniques, and sometimes software that assist in achieving asset management policies and objectives.

Safety Stratus (2024). Fire safety assets are resources, devices, and measures facilities use to secure human life and property by preventing, mitigating, and responding to fires. Businesses can implement a variety of fire safety assets in their facility depending on their needs and as required by applicable government regulations. For instance, regulations for larger businesses may require sophisticated fire suppression installations to mitigate the spread of fires and automatically notify fire departments. At the same time, the requirements for smaller operations may be more lenient, and the installation of simpler water sprinkler systems may suffice. In addition, there are six (6) fire safety assets and their uses which are listed below:
  i.   Fire extinguishers– portable devices containing a pressurized fire-suppressing agent to extinguish small fires.
  ii.   Smoke detectors and fire alarms- these devices detect smoke, an early indication of fire, and sound an audible alarm to alert everyone for timely evacuation.
  iii. Fire suppression systems– specialized and tailored equipment that suppress fires without the use of water.
  iv.   Dry sand buckets- used to smother small fires caused by liquid fuels.
  v.   Fire blankets- a blanket of fire-retardant material used to smother starter fires or as protection for people from flames and heat during fire evacuations.
  vi.   First aid kits- containers with basic aid implements for promptly addressing minor injuries in case of an accident. These usually include essentials such as burn dressings, bandages, and antiseptics.

Also listed below are several unique challenges that safety professionals can face when it comes to fire asset management. They are:
  1. Identifying assets and their locations.
  2. Keeping information on hand and up to date.
  3. Tracking inspection history.
  4. Scheduling regular maintenance and repairs.
  5. Coordinating training sessions and certifications.

Eduardo (2016), asset management has the main objective of supporting assets to achieve high performance. Therefore, different methods based on reliability engineering, risk management, human reliability, as well as life cycle cost must be performed in different asset life cycles as defined by the asset management plan.

Material and Methods: This research took into consideration the incidents that affected lives and properties. Hence, to do the review the statistically software was used to analyze the data collected. For the duration under review, it was observed that some unsafe incidents took place without adequate mechanism to curtail and moderate some activities. Hence, this led to escalation of some of these fire incidents. Though, it is the frequency of the incident occurrence that is of great concern as this not only involves assets, but also had human factor and operational management lapses. Subsequently, these events were in some instances unavoidable and though not adequately managed such as the instances of bush fire, cigarette fire, saw-dust fire and dump site fire incidents. Some instances were avoidable such as the electrical surges. Which had the Technical challenge as well as human factor. The incident of angry mob fire was identified using monitoring mechanism via crisis management mechanism. While the surveillance system is yet to identify some causes of some other incidents. Operational management and Interphase were used to identify the generator explosion incident.

Results and Discussion

Table 1: Showing market fire incidents in Nigeria for the year 2022

S/N	States Including FCT	Frequency of Incidents
1	Lagos	8
2	Anambra	5
3	Kano	5
4	Kwara	3
5	Osun,	3
6	Yobe	3
7	Rivers	3
8	Ebonyi	2
9	Taraba	2
10	FCT	2
11	Cross River	2
12	Delta	2
13	Abia	2
14	Ekiti	1
15	Borno	1
16	Adamawa	1
17	Edo	1
18	Oyo	1
19	Imo	1
20	Benue	1
21	Akwa Ibom	1
22	Jigawa	1
23	Kebbi	1
24	Niger	1
25	Enugu	1

Table 2: States including FCT and Frequency of market fire incidents in Nigeria for the year 2022.

. table statesincludingfct frequencyofincidents

States including FCT	Frequency of Incidents				
	1	2	3	5	8
Abia		1			
Adamawa	1				
Akwa Ibom	1				
Anambra			1		
Benue	1				
Borno	1				
Cross River		1			
Delta		1			
Ebonyi		1			
Edo	1				
Ekiti	1				
Enugu	1				
FCT		1			
Imo	1				
Jigawa	1				
Kano			1		
Kebbi	1				
Kwara		1			
Lagos					1
Niger	1				
Osun,		1			
Oyo	1				
Rivers		1			
Taraba		1			
Yobe		1			

Table 3: Showing the summary frequency of market fire incidents in Nigeria for the year 2022

. sum frequencyofincidents

Variable	Obs	Mean	Std. Dev.	Min	Max
frequencyo~s	25	2.16	1.7	1	8

Table 4: Showing the summary frequency of market fire incidents with calculated data, details in Nigeria for the year 2022.

. sum frequencyofincidents,detail

Frequency of Incidents

	Percentiles	Smallest		
1%	1	1		
5%	1	1		
10%	1	1	Obs	25
25%	1	1	Sum of Wgt.	25
50%	2		Mean	2.16
		Largest	Std. Dev.	1.7
75%	3	3		
90%	5	5	Variance	2.89
95%	5	5	Skewness	1.978754
99%	8	8	Kurtosis	6.844081

Table 5: Anova table of market fire incidents in Nigeria for the year 2022.

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. anova frequencyofincidents sn

               Number of obs =      25    R-squared     =  1.0000
               Root MSE      =       0    Adj R-squared =

     Source |  Partial SS        df        MS         F    Prob>F

      Model |     69.36          24       2.89

         sn |     69.36          24       2.89

   Residual |         0           0

      Total |     69.36          24       2.89
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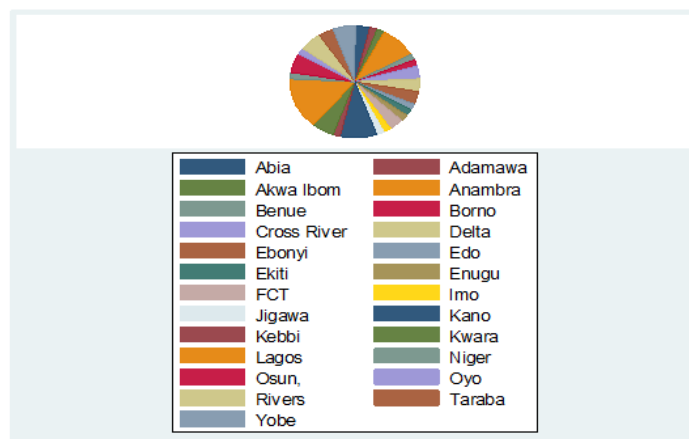
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Figure 1: Showing pie chart of frequency of market fire incidents with calculated data, details in Nigeria for the year 2022
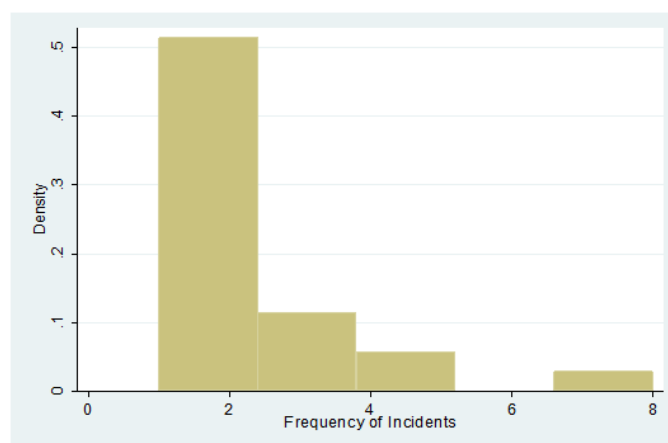

Figure 2: Showing Histogram of frequency of market fire incidents with calculated data, details in Nigeria for the year 2022.

From the tables, figures and data above, it shows that in 2022, 25 market fires incidents occurred across Nigeria. Lagos State topped the list with eight cases, Anambra five, Kano five, and Kwara, Osun, Yobe, and Rivers states with three cases each. While Ebonyi, Taraba, Federal Capital Territory, Cross River, Delta, and Abia, had two incidents each. Also, Ekiti, Borno, Adamawa, Edo, Ibadan, Imo, Benue, Akwa Ibom, Jigawa, Kebbi, Niger, and Enugu had one case each.

The summary of the incidents showed that there is a mean of 2.16 market fire incidents. This implies that there were at least two (2) market fire incidents in at least the twenty- five (25) states in the year 2022.

Conclusion

As stated earlier, this work was to review some incidents across some cities and states in Nigeria and highlight some issues of concern. While the review of incidents was for the year 2022 incidents. Evaluating the situation, from our literature using Safety Stratus fire safety assets there are six (6) fire safety assets and their uses. This shows that there are five (5) challenges that safety professionals face when it comes to fire asset management. This was not taken into consideration by those concerned. Eduardo objective on asset management which emphasizes reliability engineering, risk management, human reliability on asset management plan was not taken into consideration by critical stakeholders. There was no establishment of Interface Management Program. This was evident in the frequency of the incidents in Lagos, Anambra and Kano.

Recommendations

Based on the events and activities that led to the build –up of these incidents, the following are my recommendations. They are:

1. NASA operational procedure and standards for interphase should be coopted and used in analysis and reviewing incidents with similar experiences and instances.
2. Ascertra interface management is a framework and programs for project teams and management should be coopted into the operational activities of incidents by all critical stakeholders.
3. Fischer and Bullock ideas and theories on crisis management should be reviewed and coopted by critical stakeholders for effective crisis management as well as having a framework and strategy for putting together a crisis management team (CMT).
4. Leaders at various levels and stages should compare notes more often on world development indicators to fast track and measure up on development initiatives, programs and policies for all concerned.
5. Government at all levels should always support and constantly improve upon human development indices in their domain to encourage operational efficiency in human interphase. This will in turn be crucial in crisis management of asset management and thus deescalate crisis and tension in various domains. While minimizing or reducing the market fire incidents.
6. There is the need to establish Interface Management Program and its early implementation.

7. Government at all levels and other critical stakeholders should have adequate sensitization activities and awareness schemes and or programs on asset management and fire safety incidents. This will curtail and control unsafe fire incidents.
8. The sensitization program and events should be backed up by the law.
9. The approval and implementation of waste disposal scheme on the area of dump site fire and other similar incidents. Such as to avoid uncontrollable fire. While stakeholders should monitor and supervise any form of waste disposal activity.
10. Government, experts, critical stakeholders should review and assess situations on various assets of Government for development purposes and crisis management measures. This is to take place weekly, monthly, quarterly or annually.

References
Andales, J., (2024). *What is an asset management system*?

Bullock, J. A., & Coppola, D. P., (2018). *Intelligence and counterterrorism in homeland security (second edition)*.

Buongiorno, F, & Chiaramonte, X. (2023). *Environment. In: Wallenhorst, N., Wulf, C. (eds) handbook of the anthropocene*, 49–54. Springer, Cham. https://doi.org/10.1007/978-3-031-25910-4_8., Print ISBN978-3-031-25909-8, Online ISBN978-3-031-25910-4.

Croner-i Ltd, (2024). *Asset safety management*.

Eduardo, C., (2016). *Asset management in gas and oil reliability engineering (second edition)*.

European University Institute (2024). *Badia Fiesolana - Via dei Roccettini 9,* I-50014 San Domenico di Fiesole (FI) – Italy.

Fischer, J. R., Walters, C. D. (2013). Contingency planning, fire protection, emergency response and safety in introduction to security (ninth edition).

Gboyega, A. (2003). *Democracy and development: The imperative of local governance*, An Inaugural Lecture, University of Ibadan, 6-7.

International Institute for Environment and Development (I.I.E.D.) & World Resources Institute (W.R.I.). *World Resources* (1987). Basic Books, New York.

Jagran, J., (2016). *Health and safety authority, healthy, safe and productive lives: Introduction to human factors:* what, Why, How.

Macaulay, T., (2017). *Operational efficiency requirements and risk management RIoT control.*

Mance, J. G., (2024). *What is operations management?*

Miller, E., (2024). *Operations management: Definition, examples, benefits, and more.*

Pritchett, L. (2021). *National development delivers: And how! and how?"* | CID Faculty Working Paper Series: 398.

Reem, A., (2018). Traditional development theories have failed to Address the needs of the majority of people at grassroots levels with reference to GAD, *International Journal of Business and Social Science 9*(9) doi:10.30845/ijbss.v9n9p12.

Sewak, R. S. & Devendra, K. S. (2022*). Operational efficiency in Functional framework for IoT-based agricultural system AI*, Edge and IoT-based Smart Agriculture.

Safety Stratus, (2024). *Types of fire safety assets.*

Yong, J. K., & Sanders, G. L., (2003). *Information systems contribution to operational efficiency in success measures of information systems*, Encyclopedia of Information Systems.