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How E-Waste Management can be enhanced using Internet of Things in Developed and Developing Countries

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Abstract: *With technology advancement, Internet Of things as Next Gen of communication mode. Wearable electrical and electronic and sand printing on paper and wearable material will create people and devices inter and intra connected .IOT will be soon controlling the devices for energy saving , defect tracking , medicine and wellness and also as E-waste disposal management. The article discusses and shares the new approaches for E-waste management that can be adopted by countries, with advancement of electronic and telecommunication industry, which forms the collaborative cross technology-industry model to address the issue globally.*

I. Introduction

Green IT is the discipline of using computing resources in ways that help reduce energy and operating costs, enabling sustainable business practices and reduce the environmental impact of IT practices in the larger community. There is inherent essence to create betterment in the socio-economic and biological environment we exist.

The main issues driving Green IT revolution are as follows[1]:

- Rising energy demand with a challenge in supply and increasing utility costs
- • Management of E-waste and disposal (e-waste)
- Increasing petrol costs, which drive up employee commuting costs leading to retention issues?
- Increasing real estate costs
- Visa limitations and Rising airline ticket costs and travel complexities
- A stronger regulatory climate at the federal, state and local levels

Electronic and Electrical are fastest growing industry in the world; consequently E-waste is a global concern because of the nature of production and disposal of waste in the world. With Technology modernization, machine to machine communication or Internet of Things is the latest concept of connecting devices, tracking and controlling the devices remotely. IOT is helping businesses reduce their carbon footprints. It is expected that global greenhouse gas emissions could be reduced by 9.1 billion metric tons by 2020, , through the widespread adoption of machine-to-machine (M2M) technologies[2] .It facilitates 'smart grid' based efficiencies in the energy sector, optimize transportation and logistics, cut the energy footprint of buildings, and slash greenhouse gas emissions in the agriculture sector 3. One of the important areas of IOT is interoperability and defining the connectivity requirements for the billions of devices that will make up the Internet of Things (IoT). There are efforts on defining a common communications framework based on industry standard technologies to wirelessly connect and intelligently manage the flow of information among personal computing and emerging IoT devices, regardless of operating system or service provider.[4] E-waste is a global concern because of the nature of production and disposal of waste in the world. Although it is difficult to quantify global e-waste amounts, we do know that large amounts are ending up in places where processing occurs at a very rudimentary level. This raises concern about resource efficiency and also the immediate concerns of the dangers to humans and the environment.

With Internet Of things and wearables the quantity of electronic enabled Waste would increase exponentially.

[1] What is Green IT , why you should care :
http: //www.smallbusinesscomputing.com/testdrive/article.php/3855806/What-Is-Green-IT-and-Why-Should-You-Care.htm By Laurie Mc Cabe Dec30-2009

[2] AT&T 2020 report
[3] https://itunews.itu.int/En/4850-E-waste-and-the-Internet-of-Things.note.aspx Last referenced on 17-June
[4] The Open Interconnect Consortium Is Being Founded By Leading Technology Companies With The Goal Of Defining The Connectivity Requirements And Ensuring Interoperability Of The Billions Of Devices That Will Make Up The Emerging Internet Of Things (Iot).

Since in India the Computer E-Waste coming out of the corporate houses is given to recyclers, dismantlers, scraps dealers or stocked in warehouse for further use of electronic components in the hardware; Management of E-waste with smarter setup becomes necessary.

The article studies the Advantages and challenges with IOT and create a new Business model which would create win - win for the Business , society and the country using new IOT technology .

Advantages of IOT

There are several potential advantages with IOT as below:

1. Health Checks: Chip could be implemented into each individual, allowing for hospitals to monitor the vital signs of the patient. By tracking their vital signs, it could help indicate whether or not serious assessment is necessary. With all of the information that is available on the Internet, it can also scare people into believing they need more care than what is really needed. Hospitals already struggle to assess and take care of the patients that they have. By monitoring individual's health, it will allow them to judge who needs primary attention. The Internet of Things can also assist people with their personal safety.
2. Electronic Aspirin: Instrument plugged in the teeth for pain relief and remotely enabled to activate pulse to relieve headaches.
3. ADT, which is a home security system, allows individuals to monitor their security systems at home through their phones, with the ability to control it. Also, another technology that has already been released is GM OnStar
4. This is a system that is embedded in GM cars that can detect if a crash has occurred and it automatically calls 9-1-1. It can also track the movement of the car.
5. IoT can be useful for asset tracking and inventory control, shipping and location, security, individual tracking, and energy conservation.
6. Customer data extracted from the devices can be useful as Marketing tool to focus on the customers.

Challenges in IOT

1. Local networks for latency and bandwidth. Impacts Precision of the machines that can fail if timing is off by a millisecond, may impact the communication channel in business5.
2. Adopting the Industrial Internet of Things will require a change in the way organizations design and augment their industrial systems. IOT systems must be adaptive and scalable through software or added functionality that integrates with the overall solution.

II. Objective Of The Study

Identify the Pros and Cons of IOT with respect to the Ewaste management

III. Recommendation

1. New Business model for E-waste management for IOT enabled devices and wearables.
2. After the devices will be sold to the customer /consumer the tracking mechanism is enabled and device registered with Customer details.
3. The health check report of the devices is regularly published to the Manufacturer- Customer Care and the Customer by the device via SMS. .
4. The device faults are reported, and the manufacturer's Customer care ties the Technical support.
5. On reaching EOL of the device, the Alerts are send to the Customer care, Recycler and Customer.
6. Customer care initiates the Recycler and Customer interaction, where-in the device is sold by Customer if in Non-Working conditions.
7. Manufacturer also sends personalised Offers on the Buy-Back of working equipment crossed EOL , with the New model , in exchange offer's with discount
8. Recycler – Recycles the Non-Working device in his premises via Incineration process. [pt 5]
9. Manufacturer updates the Information of the equipment in his Device tracking system.
10. Yearly reports are shown by the manufacturer to the Government, on the Total Sales of the equipment, Buy Back of the equipment and Recycled.
11. If Customer wants to Re-Sell the equipment, then he has to have the Manufacturer's-Customer care Registration updated with New Owners details.
12. Rest of the Flow would flow same as earlier user.

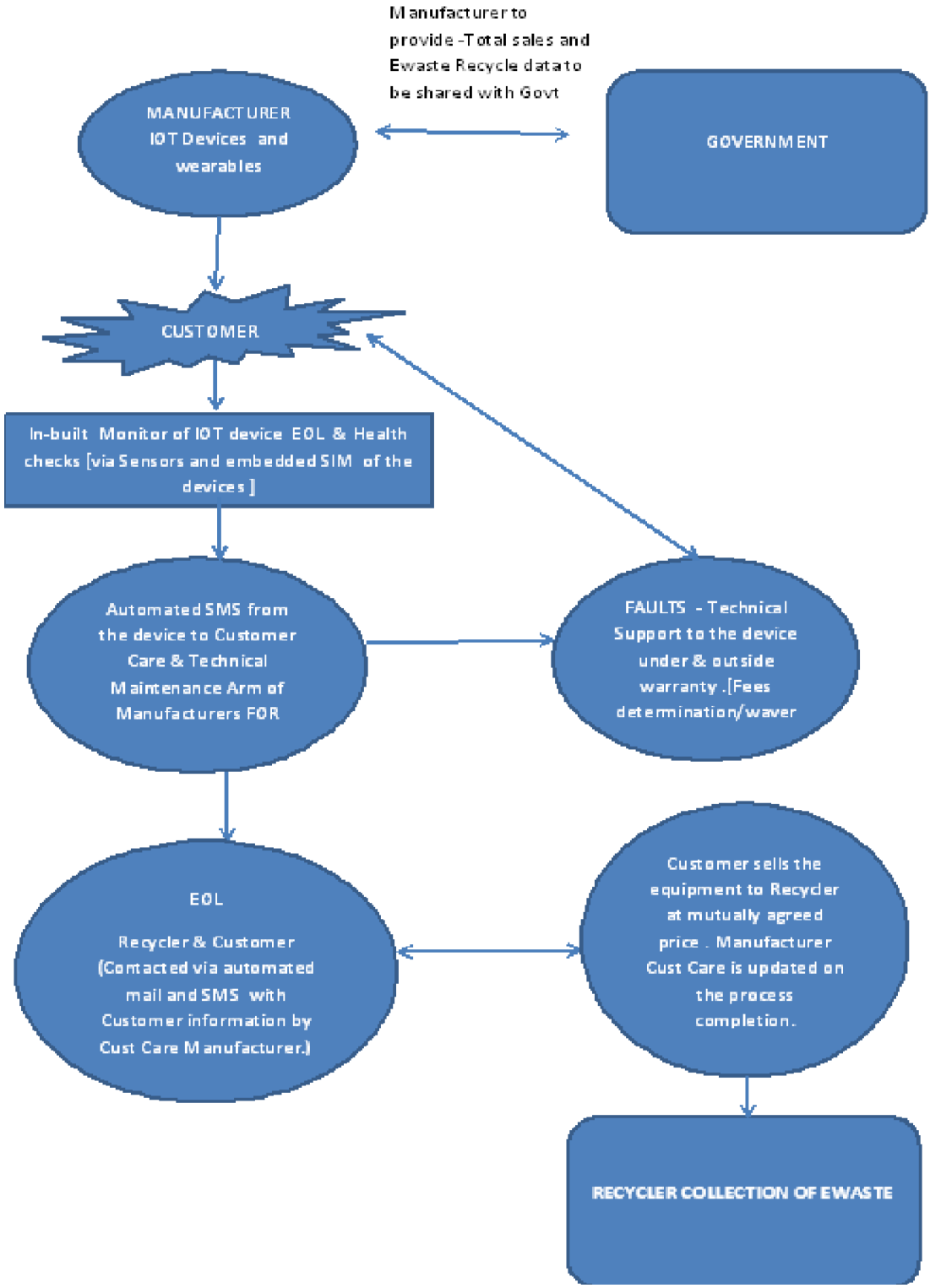
[5] http://www.cio.com/article/2872574/it-industry/5-key-challenges-facing-the-industrial-internet-of-things.html "Key Challenges Facing the Industrial Internet of Things"

Benefit Of The Model

1. Accountability of the Equipment maintenance and Recycle remains with Manufacturer

2. Government has eye on Electronics production and Recycle quantity for All the Manufacturers.

3. E-waste is disposed by Formal channel of Equipment Producer Responsibility, reducing carbon footprint and impact to the environments.



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