

CLEANER PRODUCTION - PREVENTING POLLUTION AT SOURCE

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Rank Xerox and Xerox Corporation take the environment very seriously. After two years as Director of the Environment, I have found that managing the environment in fact means managing business. This presentation will attempt to explain this belief further.

The Company

- Revenues: 2.8 billion pounds sterling in 1992.
- The parent company, Xerox Corporation, had revenues of about US\$ 18 billion.
- Employees: 28,000.
- Xerox employs more than 100,000 people world wide.
- Rank Xerox has production units with 4,000 employees in:

Venray (The Netherlands).
Lille (France).
Mitcheldean (United Kingdom).
Coslada (Spain).

- Xerox calls itself the "Document Company," as it deals in electronic documents as well as paper.

European industry faces considerable pressure from all sides, including national and international legislation. In Europe alone 300 directives and pieces of legislation have already been passed, which have to be introduced. Although Xerox is affected by many of them, it is difficult to say how much national legislation impacts on Xerox's business; and legislation is not the only pressure. Customers are increasingly requesting environmentally-friendly products and services. Others involved, such as employees, especially of the younger generation, also apply pressure; they are very environmentally-conscious, and want to work for a company which cares for the environment. Finally, it should not be forgotten that competition is on the alert, at least competition from the Far East. They already understand what the word "environment" means.

When Xerox started out, it performed a situation analysis to see what the environmental problems were, and where the company stood. There are certain environmental issues which Xerox cannot affect, like world population growth, the protection of wild life, or nuclear waste, because the company is not in that kind of business. But there are other issues where Rank Xerox, which is only in the office equipment business, has made a more considerable contribution than anticipated.



Figure 1: The Environmental Pressure

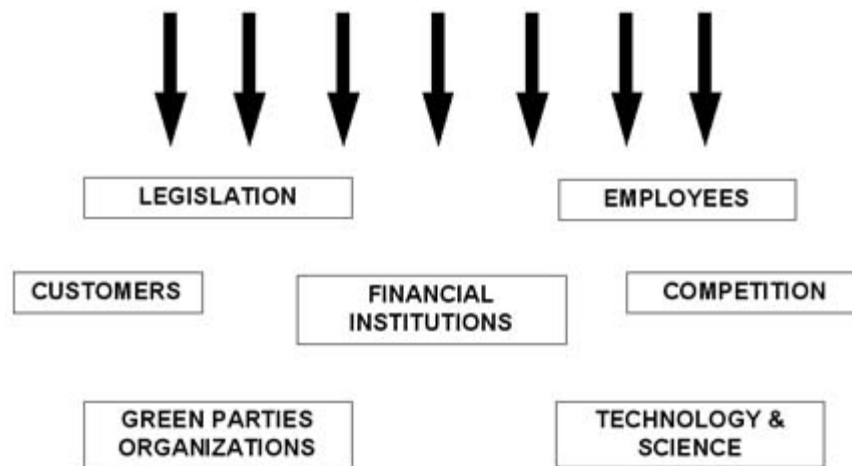


Figure 2: Where is the pressure coming from?

Environmental Issues Rank Xerox Can Influence Directly

- The Greenhouse Effect (global warming)
- Destruction of the ozone layer
- Water pollution
- Air pollution
- Waste disposal
- Energy consumption
- Emissions: noise, odor, heat, dust, electro-magnetic
- Forest destruction
- Global resources limitations

The following survey summarized in Table 1, was carried out in the United Kingdom on Xerox's behalf. Respondents have very clearly expressed what their environmental priorities are: industrial pollution, energy conservation, and the "Greenhouse Effect". The ranking in order of importance can be seen below.

**Table 1: Environmental Issues in Order of Importance
United Kingdom Survey Results**

Industrial pollution	83%
Energy conservation	74%
Greenhouse effect	60%
Ozone depletion	60%
Waste disposal	57%
Cutting out waste	55%
Recycling of materials	39%
State regulation and control	37%
Quality of design	32%
Congestion	32%
Environmentally friendly purchasing	18%
Improved working environment	17%
Use of recycled paper	15%
Noise reduction	14%
Consumer lobbies	12%
VDU screens	3%

These environmental requirements and priorities may not be true everywhere in Europe; Greece is not the same as Germany, Holland or the Nordic countries, but the removal of waste-packaging material is certainly at the top of the list in any country, as well as the recycling of that waste. In addition, Eco labels like the Blue Angel in Germany or the Swan in the Nordic countries, are very important aids for customers when making purchasing decisions.

- Removal and disposal of packaging materials by the company, upon delivery of the equipment
- Recycling of waste and obsolete products
- No hazardous materials
- Clear product information
- Increased product life-time reliability

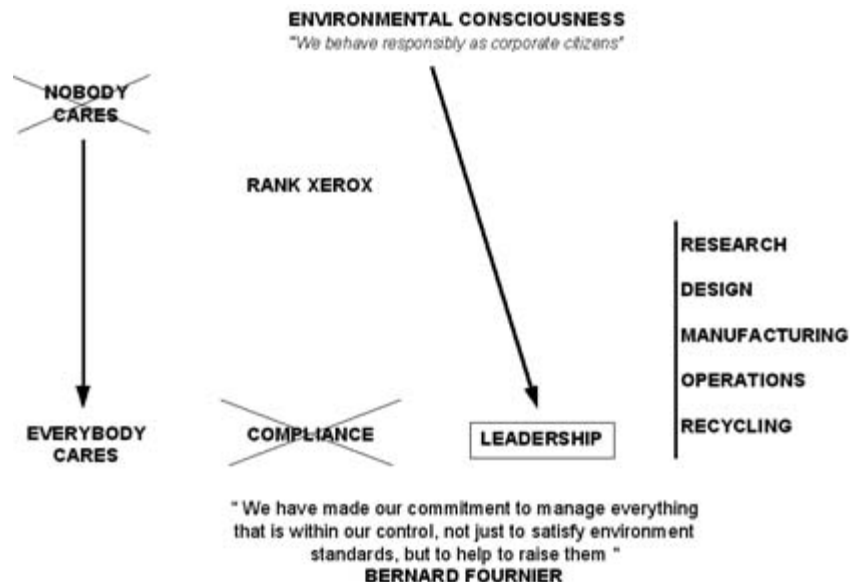


Figure 3: The Management of Change

- Request for an environment management system
- Low power consumption especially in stand-by mode
- Plastic parts to be marked with standardized recycling logos
- Noise level in office equipment minimized
- Decisions based on Eco labels

Figure 3 shows a "nobody cares" situation and an "everybody cares" situation. Everybody in the company is responsible for the environment. Everybody must care, and everybody can contribute. Mere compliance with laws and regulations is not what Xerox is aiming for. It wants to be in the lead, to be seen as a leader in working to change current attitudes towards environmental protection.

The most important area for change is research development which has to come up with different kinds of products for the future. These products have to be designed for the environment. Whatever companies say, including Rank Xerox, genuinely environmentally-friendly products are not yet on the market; they are still to come. Some of the changes required need to be incorporated into the product specifications. This has been done, but the products are not yet on the market. Manufacturing, processes have to be changed. Ozone-depleting chemicals are no longer acceptable and Xerox has already done a great deal to eradicate them.

To be an environmentally sound company is not enough on its own; everybody who works with Xerox, such as its suppliers, must also be pulling in the same direction. Working with such a program also means that a company must finally evaluate its activities. Therefore Rank

Xerox has regular customer-satisfaction surveys from which it assesses its customers' reactions, not only for quality, but also for environmental performance. Employee motivation and satisfaction surveys are also carried out, as are benchmarking and market surveys.

Finally environmental audits are performed.

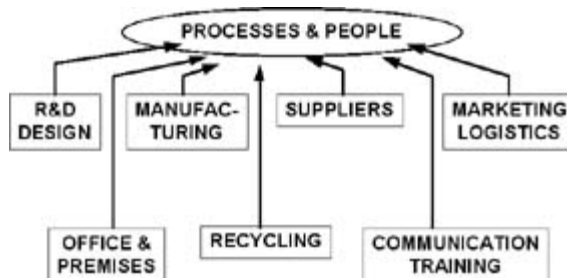


Figure 4: Scale of the Project
Environmental Benchmarking

- There is a high level of willingness to cooperate in the industry
- The common areas of interest are:
 - Environmental management
 - Environment training
 - Product stewardship

Environmental Surveys

A questionnaire was sent to 30,000 customers, or potential customers, all over Europe in eleven countries. Greece was not involved unfortunately, but will be at a later stage. The question was: "if a copier contained recycled parts, to help the environment, would it be acceptable?" Quite a high percentage said yes. Moreover, when asked what they would be willing to pay for it, a majority said they would pay the same or even more. It seems then that customers are willing to pay more, since, although environmentally-friendly paper is more expensive than conventional paper, there has been quite a large increase in sales of environmentally-friendly paper.

Market Survey Results

Question 1: If you could buy a copier with recycled parts to help the environment, but with the same warranty and performance as a copier made from 100% new parts, would you consider it?

82.5% of the respondents answered yes

Question 2: If yes, what price would you be prepared to pay for it, relative to a completely new machine?

64% of those respondents in favor of recycled parts in new machines are prepared to pay the same price or even a little more. Only 29% expect to pay less (7% were undecided)

This is Xerox's published policy and not an internal document. The second point is more important than the first; since concerns for environmental health and safety take priority over economic considerations. It is very important for a company to have a commitment from the top that goes that far, and Xerox has made this commitment.

The three priorities from the initial analysis to be worked on are: First, the ban of all ozone-depleting chemicals, which is targeted for 1993. Second, the reduction of waste disposal in landfills to zero, by 1997. Third, a significant reduction in energy consumption by 1997. Although Xerox might not reach zero landfill waste disposal in the mathematical sense, it will be very close to it. For this purpose, machines and products must be designed to achieve these goals. With regard to ozone-depleting chemicals, Xerox actually achieved its target in June of 1994, when the last manufacturing process was made CFC free.

Rank Xerox Environmental Health and Safety Policy

Rank Xerox is committed to the protection of the environment and the health and safety of its employees, customers and neighbors. This commitment is applied world-wide in developing new products and processes.

- Environmental health and safety concerns take priority over economic considerations.
- All Rank Xerox operations must be conducted in a manner that safeguards people's health, protects the environment and conserves valuable materials and resources.
- Rank Xerox is dedicated to the continual improvement of its performance in environmental protection and resource conservation.
- Rank Xerox is dedicated to designing products for maximum conservation of resources, and to taking every opportunity to recycle or re-use waste materials generated by its operations.

Environmental Leadership Strategy The principle of Xerox's waste reduction policy is first to reduce waste, then re-use material and lastly, recycle. It aims for landfill reduction, as well as further reductions, especially on packaging materials. The generation of new material-saving ideas has not only been good for the environment, it has also saved Xerox money.

Xerox recovers office equipment from customers, when the life-span of this equipment is up, so that the product life-cycle may become a closed loop. The life-span of office equipment is not determined by the customers or the extent of usage; it is the contract, the leasing or rental agreement, that determine these life-spans, which can be from 3 to 5 years. Some of the parts can be re-used, while others are just used for material recycling. The financial benefits are, however, very substantial.

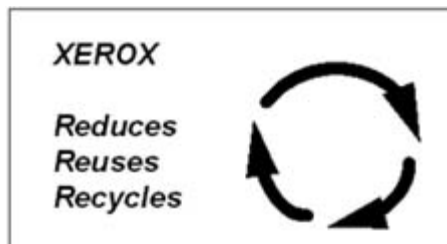


Figure 5: Waste Reduction Principle

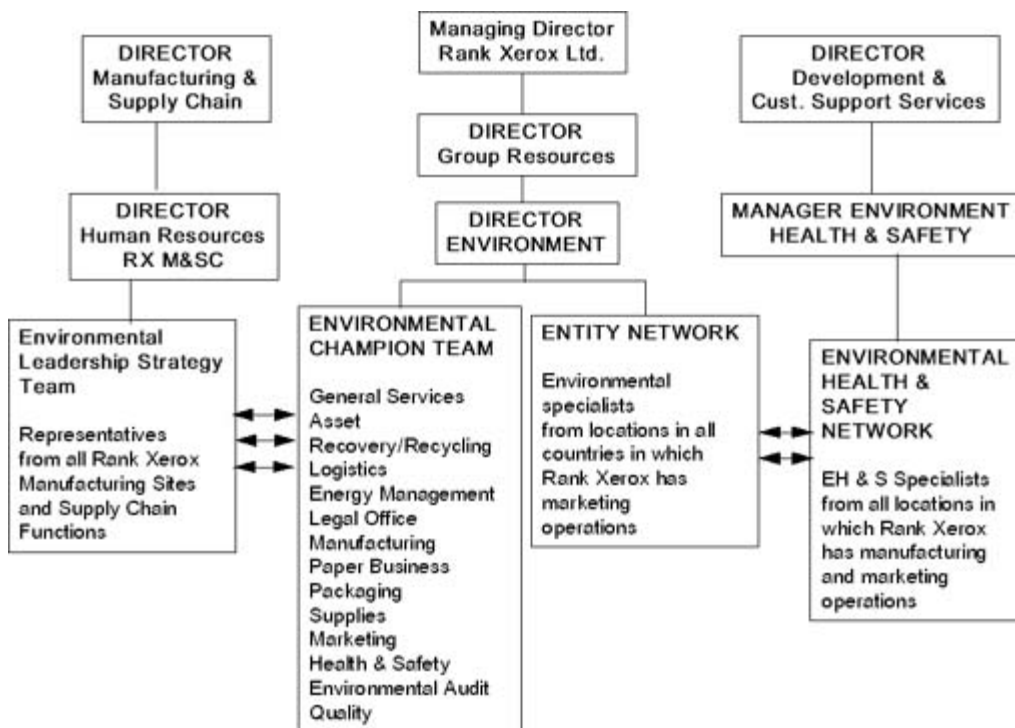


Figure 6: The Environmental Network Organization

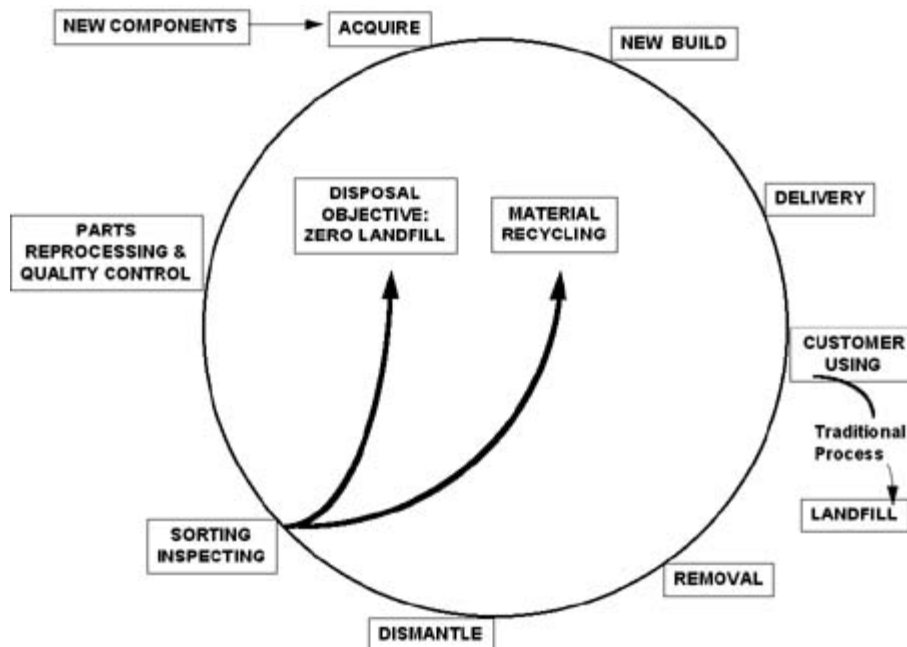


Figure 7: The Product Life Cycle is a Closed Loop

Here is a practical example of a product, which was initially introduced in 1981, and which is now being recovered from customers. Xerox was able to re-use 51% of the components in manufacturing new products; material recycling was 46% and only 3% was disposed in landfills.

The company has a branch in Holland and a separate recycling plant, which it is very proud of, and where visitors are welcome. As a company, Xerox cannot compromise quality. Virtually all of the waste from Xerox's factories was initially thrown away, but now more than 70% gets recycled.

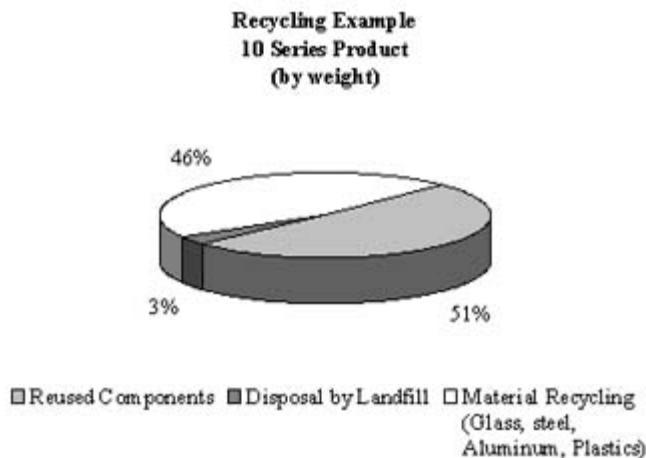


Figure 8: Recycling Example

**Table 2: Waste Reduction & Recycling Report
Rank Xerox Manufacturing**

Waste Category	Percent Recycled
Fine Paper:	
White Paper	100%
Mixed Paper	100%
Corrugated Cardboard	100%
Metals	100%
Glass	100%
Plastics:	
Hard Plastics	100%
Polystyrene	96%
Wood	100%
Yard Waste	0%
Toner	100%
All Other	59%
TOTAL	73.4%

Xerox's environmental track record starts back in the 1960's, and has undergone over thirty years of continual improvement and innovation. Xerox and Rank Xerox have also received very important awards. Fuji Xerox, the company's Japanese joint venture, has received the Deming Award; Xerox, the Malcolm Baldrige Award and Rank Xerox, the EFQM which is the European Quality Award. Finally, Xerox received the WEC Gold Medal for world-wide management.

Table 3: Environmental Track Record

1960's	Recovery of selenium alloy and aluminum from waste photoreceptors introduced
1970's	Automatic energy saving modes for copiers and printers introduced
1970's	Automatic two-sided copying introduced
1970's	PCB containing components (i.e. capacitors, transformers) were banned from all Rank Xerox products
1977	Replacement of harmful chlorinated solvents by water-based cleaning processes commenced (first in Sweden)
1980's	Clean up of polluted sites started
1981	Introduction of water-based paints commenced
1987	Dedicated Asset Recovery Operations (ARO) founded in Venray which received the ISO 9000 certification in 1992
1990	Chlorine-free environmental paper introduced. In 1991 Rank Xerox launched recycled paper, received the Blue Angel Award
1991	Corrupad Packaging introduced as replacement for expanded polystyrene
1991	Independent Environment, Health & Safety audit introduced for all Rank Xerox Manufacturing Plants
1992	Environmental requirements defined and implemented in the Product Delivery Process (PDP). Life-cycle analysis principles adopted
1992	Director, Environment announced
1992	Organic Photoreceptor Production started in Venray
1992	Rank Xerox becomes the first company to receive the European Quality Award (EFQM)
1993	Xerox achieved the World Environment Center (WEC) Gold Medal for International Corporate Environmental Achievement
1993	CAT 1 Ozone Depleting Chemicals (CFC) eliminated from all Rank Xerox production processes

The company has worked hard to reach this level. Xerox's belief is that no company can call itself a quality company if it does not care for the environment; this is an essential element of its policy.

Environmental Quality To put good things to practice is one thing, but if you do not tell your employees, your customers, and the public, they will not realize it. Communication is a key factor. Actions are not just taken for show; they can actually save money.

- Meeting with the RX champion team
- Meetings with the environmental network
- Yearly environmental progress report
- Environmental training of employees

Press releases about environmental achievements

- Environmental clubs
- Environmental exhibitions
- Lectures at universities
- Support of environmental -- Advertisements congresses
- Articles in internal publications
- Corporate video
- E-Mail communication

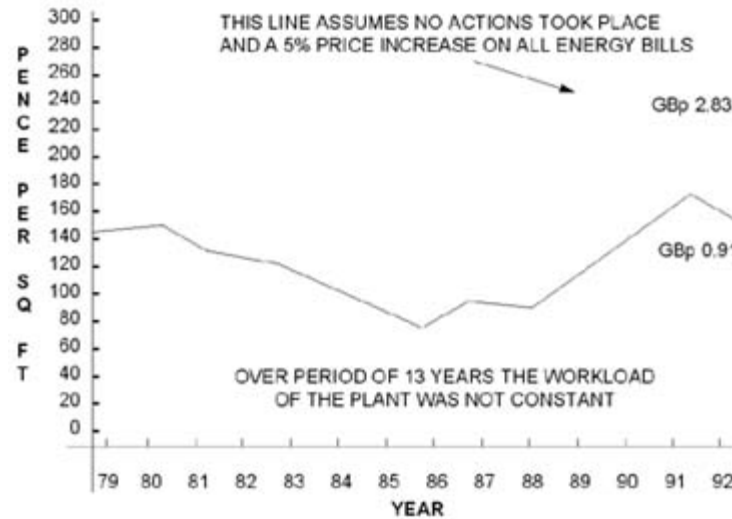


Figure 9: Rank Xerox Mitcheldean Plant Energy Management Progress

Design for the Environment

There is no environmentally friendly industrial product

- Any product requires certain resources, and energy is required for production, transportation and often for the operation of the product
- One product can however be better than others if the whole product life-cycle is taken into consideration

What is an environmentally friendly product?

- There is no clear specification or standard
- The environmental specifications such as the "Blue Angel" in Germany only give certain guidelines
- Innovative design by well-trained engineers is required

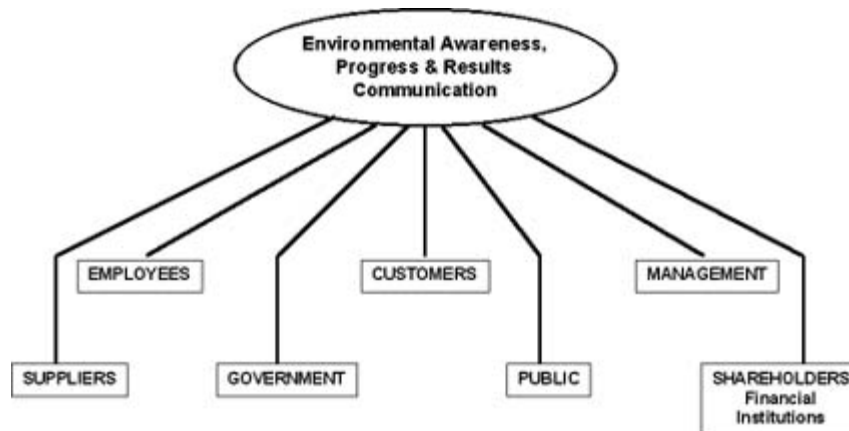


Figure 10: Informing those involved

Common Principles

- Office equipment must be designed for easy disassembly to allow the recovery of components for reuse.
- Components are to be designed with a long life-span in mind, and should be used in more than one product generation.
- Machine components should be standardized for multiple use.
- Only a few different types of plastic materials should be used, and they should be recyclable. The plastic parts have to be marked with ISO symbols for material identification.
- Excessive use of materials should be avoided. If possible, multiple-use packaging should be preferred.
- Office products should have an energy saving mode and should not use energy at all when switched off.
- Products should not include toxic materials, and toxic substances should be avoided in production processes.
- Ozone depleting chemicals should be banned from production processes
- Parts which are reused or which are produced from recycled materials must not compromise quality and reliability.
- Products have to satisfy all regulatory requirements and should qualify for environmental labels, i.e. "Blue Angel".
- The manufacturer should be committed to take the product back for recycling after its life-span is up.

Compensating for prior environmental damage is expensive at first. Xerox has already spent 12 million dollars on a remedial programs, and about 5 million dollars for process improvements. But avoiding disposal costs by recycling saves one million dollars a year, and manufacturing saves an additional 10 million dollars a year. In conclusion, although it initially costs a company money, in the long term caring for the environment will be financially very profitable for that company.

Before joining Rank Xerox in 1974, **Karl Kummer** held senior positions with various German companies such as Zuse KG, in Quality Control Vorwerk, MDS and IBM. During his twenty years with Rank Xerox he has held leading management posts or directorships in several countries with the company, including Holland, Germany, India and the United Kingdom. Before taking up the position as Environmental Director, in 1992, Mr. Kummer was Director, Business Operations in India, where Rank Xerox has a joint venture with the Modi Group where he gained valuable insights into developing countries' environmental problems. He has also been responsible for the realization of the Rank Xerox Environmental Leadership goals. Presently he holds the position of Managing Director, Rank Xerox Nigeria