

A case study: Al-abdullatif industrial investment company carpet manufacturing and waste management: A new look

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Abstract

Rapid depletion of the environment has posed an alarming situation for the entire world. This has called for a major change in the policies and practices followed by the various sectors in the economy. This paper is a case study based on Al-Abdullatif Industrial Investment Company. The aim of the paper is to analyze the usage of the manmade yarn being used in carpet manufacturing industry, from out of the by-product of the petrochemical industry and recycling techniques employed in the company so as to evaluate its contribution towards a greener environment. The focus is on the disposal of waste in a greener way so as to reduce environmental hazards. The paper provides significant information about the types of carpets manufactured, the process involved and most importantly the techniques employed for managing waste. The paper throws light on how waste generated by carpet manufacturing can be managed cost effectively keeping in mind the environmental concerns.

Keywords: Carpet manufacturing, waste generation, waste disposal and environment protection

1. Introduction

The most important concern in today's time is the rapid degradation of the environment. The rapid deterioration of natural resources such as air, water, soil etc. is known as environmental degradation. In the present scenario pollution free activities are given more importance in all the sectors and in all stages. This has led to the development of a new concept globally. The industries are required to carry out activities such as production, consumption, post usage and also marketing of the products effectively, keeping in mind the most important concern i.e. environmental safety. This concept according to ([https://en.wikipedia.org/wiki/ Green marketing](https://en.wikipedia.org/wiki/Green_marketing)) is named as 'Green Marketing. According to the American Marketing Association, "green marketing is the marketing of products that are presumed to be environmentally safe. Thus green marketing incorporates a broad range of activities, including product modification, changes to the production process, packaging changes, as well as modifying advertising". (<http://philipkotler2013.blogspot.in/2011/11/green-marketing>). Some businesses have been really quick to accept concepts like waste minimization and environmental management systems and have incorporated environmental issues into all organizational activities. The Environmental problems all over the world are growing rapidly. The rapid growth of population, increasing economic development and growth of industries is putting a lot of strain on the environment and the natural resources. Soil erosion, Industrial pollution, deforestation, urbanization, rapid industrialization and land degradation are all worsening problems ([https://en.wikipedia.org/wiki/ Environmental_degradation](https://en.wikipedia.org/wiki/Environmental_degradation)). It will not be wrong to say that the time has come when the concept of green marketing has to be accepted globally. The time has come for the marketers to act as early as possible. The condition of the environment is expected to worsen even further in the years to come. According to the book "the new

rules of green marketing" by Jacquelyn A. Ottman, most scientists have predicted that the average temperature of the earth will rise between 1 to 4 degree Celsius during the 21st century, solely due to the burning of fossil fuels. By 2030, climate change induced calamities are projected to account for 500000 deaths and \$340 in damages. The book "the green marketing manifesto" by John Grant also supports the study conducted by the scientist that if adequate measures are not taken to protect the environment that it may result in some ugly scenarios and would make the survival even more difficult. The rise in temperature may sound like a slight change but the reports very likely point out to mass extinctions, droughts, floods, spreading fatal diseases and extreme weather leading to significant peril to human life. The concept of green marketing can only be applied when strict rules and regulations are enforced in all forms of business activities to ensure a particular standard for maintaining a healthy environment. With the increasing threat of global warming, it has become extremely important that green marketing becomes a norm rather than an exception. Recycling of papers, plastics, metals etc., in a safe and environment friendly manner should become universal and much more systematized. It has to become mandatory to use energy-efficient lamps and other electrical goods. Marketers also have the responsibility to make sure that the consumers understand the need for and benefits of green products as compared to non-green ones. In green marketing, consumers should be willing to pay more in order to maintain a clean and green environment. Green marketing is of utmost importance and relevance in developing countries.

Since green marketing has become an important phenomenon globally, still there are various industries that have not yet explored the benefits attached to this concept. One such industry is the carpet manufacturing industry. Not many have observed that waste generated by the carpet manufacturing can also be harmful for the environment, as the input being used is

the manmade fiber and this being the by-product of petrochemicals can be substantially damaging the environment by affecting adversely the soil and the water underneath. Carpet manufacturing besides being a man-made task has also evolved around the technology and the sheer volumes and availability of resources have led to massive advancement of technologies and this industry is now highly reliant on machineries to process the manmade fiber into the input products like yarn, carpet backings which are used for manufacturing various varieties of carpet (<https://en.wikipedia.org/wiki/Carpet>). Usage of machine that are having precision and computer based controls has helped the industry to be cost effective and depend on volumes. But these volumes have also led to generate huge wastages in the manufacturing process, which if not suitably handled would lead to substantial environmental issues, that would be so expensive to manage and extremely harmful for the living beings on earth. The process of the petrochemicals is highly environmental un-friendly and hence if the waste in subsequent process is not controlled or adequately reprocessed it would lead to higher impact on the environment. The amount of gasses that are emitted in the petrochemicals industry is already a matter of concern for environmental scientists. The waste generated and the pollutants generated from the carpet manufacturing process need to be adequately managed as these if not handled properly are very harmful for the natural environment.

2. Background Study

The Al-Abdullatif Industrial Investment Company is the brand name of Al-Abdullatif family which is reckoned to be one of the highly valued, successful industrial groups in the kingdom of Saudi Arabia. The group has over 60 years of presence in the kingdom and was started by the visionary Omer Suleiman Al-Abdullatif as trading group dealing in carpets, furniture, and other home decor applications. (<http://www.carpets.com/history.htm>). Once established as the pioneers in the field, the business vision went to a new high to establish the group as an industrial entity, which can serve customers based on their local needs, at a cost that's competitive, with product that matches the international quality standards and the deliveries that are in tune with customer demands.

The first manufacturing unit was set-up way back in 1983 with few machines that could produce machine made tufted as well as woven carpets and over the period it is now established as a brand in the market with highly vertically integrated business and value for money to the customers. Group continued to have ventures in furniture and home decor applications and added manufacturing facility in this field too. The real estate market with infrastructure development focused by the government was booming and the group took the strategic decision to move into real estate segment also to capitalize the market driven energies.

The group works on the following vision, "We see opportunities and avenues from a long-term perspective to give better value addition to stakeholders' i.e. government, society, customers, suppliers, employees and shareholders." (www.carpets.com). With above core vision the group further diversified into cement business and then to the copper and aluminum cables business. Also group became part of joint ventures in the kingdom and Saudi Arabia and abroad in

petrochemicals, ceramic tiles, and Real Estate, Chemicals, sugar and insurance services.

Today, operating with nine subsidiaries specializing in spun yarn, Bulk continues filament yarn, Carpet backings, master batches and colors, paper tube and blankets, Tufted and woven carpets and with over \$375m turnover AIIC is the largest carpet manufacturer in the Middle East, North Africa, (MENA) region - a market accounting for 75 per cent of its output. Worldwide it ranks Number Six. AIIC has become a popular brand by Supplying good quality carpets and rugs at reasonable prices which have been achieved by vertical integration, wonderful infrastructure, best-in-house technology, product innovations and world class quality standard. AIIC has evolved into a diversified manufacturer selling directly to manufacturers, exporters, importers and retailers. All the carpet intermediaries are being processed in-house except for the basic raw materials. This implies that the supply chain requirements can be managed in-house, giving them a substantial cost advantage.

2.1 Types of carpets manufactured by Al-Abdullatif industrial investment company

Carpets can be manufactured by two ways either handmade or machine made. Al-Abdullatif Industrial Investment Company engages only in machine made carpets. The company manufactures three types of carpets namely:-

1. **Woven Carpets:** - This type of carpet is made on a loom which is quite similar to a looms for weaving fabrics. Generally many colored yarns are used for producing a woven carpet with designs that are created on the Cad systems. The yarn comes as weft and warp and the pile is created with colored yarn through design patterns that are generated through CAD systems. The process involved in producing woven carpets is capable of producing complex patterns from preset designs, by use of computer added technologies. The machines are capable of manufacturing cut pile and loop pile carpets or even a combination of both in the same carpet. In effect there no limitations to weaving methods used with high standard machines, with regard to accuracy of pattern, design or the quality of the carpet. These types of carpets are the most expensive because the manufacturing process is relatively slow. These are very famous in India, Pakistan and Middle East, America, Canada, Australia, New Zealand, Belgium etc. woven carpets are like fashion items and are used as home, office decors and also in the commercial establishments.
2. **Tufted Carpets:** -Tufted carpets have a completely different manufacturing process as compared to woven carpets. The pile yarn is stitched onto the primary backing and then a secondary backing is stuck onto this cloth by latex. This is the preferred carpet for wall-to-wall carpeting and generally used widely for carpeting the rooms of the homes and offices, particularly in the cold environment, as soft flooring. It can be produced in different qualities depending on the end use application. AIIC produces tufted carpets for residential, light commercial and some light to medium commercial applications, including external soft flooring like gardens made from the artificial grass. There are various types of tufted carpets that are manufactured by AIIC on the basis of their use and quality namely: - polyester tufted carpet,

nylon tufted carpet, polypropylene tufted carpet and grass tufted carpet.

- 3. Non-Woven Carpets:** - Non woven carpets are manufactured by a different process compared to Tufting and Weaving. Non-woven carpets are made from Polypropylene Fibres. The fibres are formed into a web by Needle punching and then thermally bonded to form the carpet. They are the cheapest form of carpet and not very long lasting and hence they are used in applications where the need is short or not much traffic for an extended period of time. They are most commonly used for automotive applications or as underlays, for short period usages like exhibition halls and foot-mats, etc. They are available in latex backed form for direct usage or non-latex backed form for thermal forming applications.

3. Material Inputs

The raw materials used by the company include Polypropylene chips (PP), nylon chips (Nyl) and Polyester Fiber (POY). PP and POY is the by-product of the refining process of oil. Nylon is made from out of Caprolactum. These entire RM are non-bio-degradable. The quantities of raw materials annually used are 70000 tons of PP, 15,000 Tons of NYL and about 10,000 Tons of POY respectively. Of above about 180 Tons is consumed for manufacturing pigments with the added PP grade color powder, 30,000 MT is used for manufacturing primary and secondary backing and rest is used for manufacture of yarn. Through the usage of these raw materials intermediary materials such as Yarn, Tapes and Master batches (Colored pigments for yarn and tapes) are produced. With the help of these intermediary materials Al-Abdullatif Industrial Investment Company engages in manufacturing of carpets, rugs, carpet backing, and artificial grass.

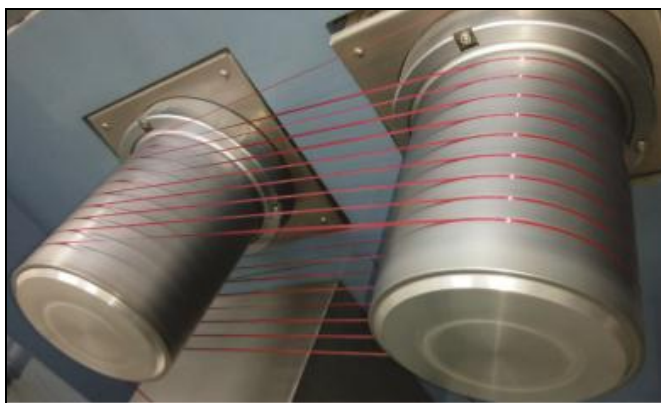


Fig 1: BOBBIN (taken from the company's website.)

3.1 Manufacturing Process

After having a proper knowledge about the raw materials and types of carpets produced by AIIC it's important that we know about the manufacturing process in detail. The detailed process will help us analyze the waste generated and the recycling and disposal of waste in an environment friendly manner.

3.2 Wooven Carpets

In weaving, the weft is the term for the thread or yarn which is

drawn through the warp yarns to create cloth. Warp is the lengthwise or longitudinal thread in a roll, while weft is the transverse thread (https://en.wikipedia.org/wiki/Warp_and_woof). For creating the base of the carpet that is the carpet cloth AIIC uses machinery in which the weft is the cotton yarn and warp is jute. To create pile the Polypropylene yarn is used. Bobbins of cotton and jute is placed on the machine in such way that cotton one enters vertically and the jute enters horizontally through bobbins. The PP yarn bobbins are placed on the creel as per the computer calculations and locations identified as per CAD. This yarn is fed to the machine in such a way that knots are created when the warp and weft is woven with the PP yarn. The surface of the carpet has the pile either cut or loop with designs that are crated through the PP yarn. Bobbin is a paper tube on which yarn is placed and the creel is series of feeding points on which the bobbins are placed. In the weaving machine the cotton yarns is fed through bobbins for weft from bottom and while the warp is fed from the left side.

AIIC has its own weaving plant. The plant has the most modern carpet weaving machines from Belgium and Germany. Along with this AIIC also has an art design studio with modern design software ensuring fast and flexible design development.

3.3 Tufted Carpets

The basic input materials used in the process of making tufted carpets are primary backing, secondary backing and yarn of different types and colors. The basic input material for the primary and secondary backing is Polypropylene chips and fiber made out of Polypropylene chips. The yarn could be made from chips of Nylon, polypropylene or polyester chips or fiber.

The process of manufacturing tufted carpets can be explained as, that the desired yarn is fed to the tufting looms through bobbins that are loaded on the creels and the primary backing comes from the top of the loom (http://www.carpets.com/carpets_en/product_tufted.htm). This yarn is tufted through machines on the primary backing, which is like a cloth made of PP tapes. This tufted yarn is loose as there only a tuft and no knot and need adhesive bonding which is done on another machine where the secondary backing comes from the top and the tufted carpet role come from the bottom and there is a roller, on which through the jet process the latex flows and the carpet role and the secondary backing passes through this roller. This joins the secondary backing to the tufted carpet and through the heating process the latex is dried and the pile yarn at the back, primary backing and secondary backing are joined through this adhesive.

Carpet Backing: - The primary and secondary backing are produced by the following process:

3.4 Primary Backing

The primary backing is produced with the component called Tape, which is used as warp and weft both on a horizontal loom. The tape is prepared by the process of extrusion from the extruder machine. Polypropylene chips along with the master batch i.e. the color and calcium carbonate are passed through the extruder where all these components melt and a colored film is extruded. This colored film passes through the cooling chambers and then through inline cutting machines is cut in to small width tapes depending upon the production

requirements. Once Tape is obtained this is rolled on bobbins for further processing. From the bobbins the tape is rolled on to the beams, where a set of creel is used with several bobbins loaded on it and this creel is connected to the beaming machine which in turn draws tape from the creels to roll it over the beams for further production usage.

This is the startup process for making backings for tufted carpets and the initial waste that is generated comprising of left over tape on bobbins, leftover tape on beams, tape not as per the required specifications and the sides of the molten film

etc. This tape and yarn is used as virgin material to produce the tapes through inline recycling.

This helps reducing the Raw material cost and also reduction in generation of toxic wastes.

The tape now in the bobbins and beam is loaded as warp and weft on the horizontal weaving looms where it is woven as normal cloth of different weight and variety. Some backing in the production process is also found to be as non-standard which is a process waste in the weaving section.

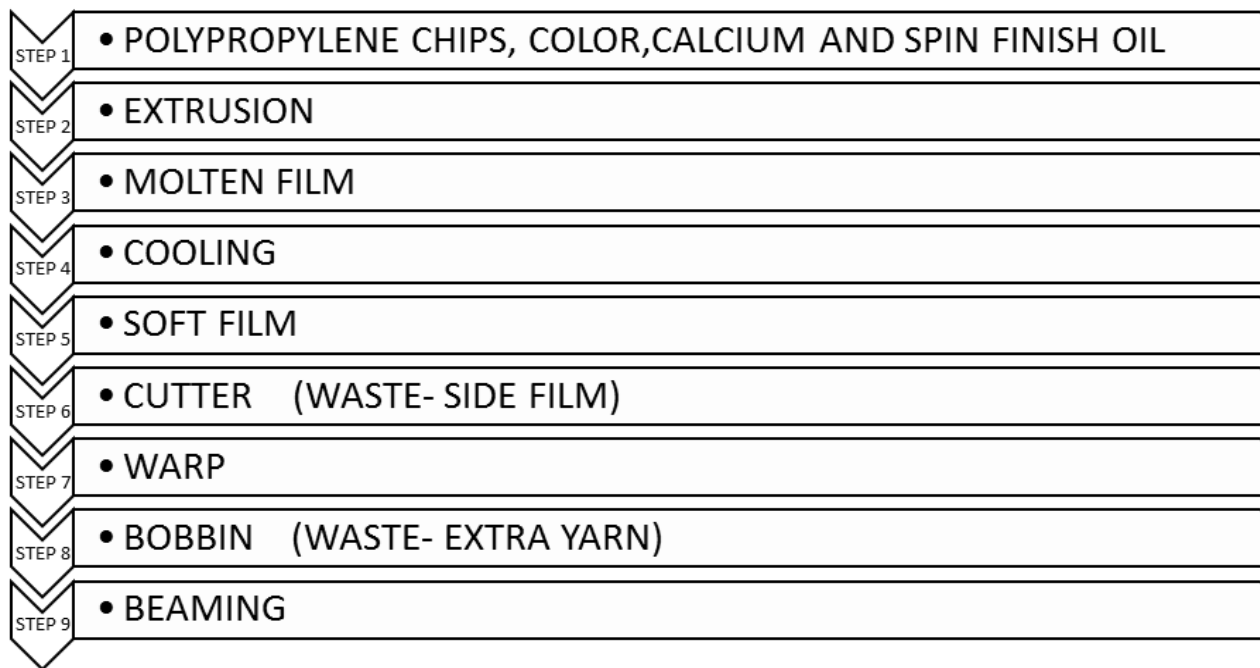


Fig 2

3.5 Secondary Backing

Secondary backing is made of tape and yarn extruded through the process of extrusion. Making of yarn is slightly different where the yarn is extruded and then intermingled with polyester fiber to make it little hairy for the secondary backing while in the case of primary backing its only tape that is used to make it strong. The hairiness in the secondary backing is required for giving the backing adhesive quality.

3.6 Waste generation and management

In general there are two most important ways of managing waste:-

- 1. Source reduction:** - It is important that the industries should concentrate on minimizing waste generation. Source reduction is the first step in an integrated waste management system. Also the waste that has been generated should be either utilized in making other products or should be reused.
- 2. Recycling:** - Recycling is a vital concept of modern waste management system. It involves reprocessing of waste materials into new or reusable products. Recycling helps in reducing the harsh impacts on the environment. The best part of recycling is when a waste can be regenerated in the form of a new product. This helps in slowing down the damage that can be caused to the environment. (<http://www.textilevaluechain.com/>)

[index.php/article/technical/item/273-textiles-waste-recycling](http://www.textilevaluechain.com/index.php/article/technical/item/273-textiles-waste-recycling))

In the carpet industry waste management was never an integral part of the system. However with recent developments that are industries becoming more vigilant in respect to green marketing and consumer awareness, waste management has become a serious and key factor. Al-Abdullatif Industrial Investment Company thus focusses on these aspects very critically. The waste generation and management is closely monitored in the following way:-

3.7 Woven Carpets

The manufacturing of woven carpets results in the generation of waste in the form of left over yarn on bobbins. AIIC handles these wastes in a very efficient and cost effective manner. The left over yarn on the bobbin goes for a rewinding process in which fresh bobbins are made for reuse. Alternatively, the yarn that cannot be used for making fresh bobbins is cut into smaller portions for the purpose of making non-woven floor coverings. These non-woven floor coverings are used in car mats, under lays etc. as low end products. After all the above processing of waste, the left over yarn is then packed through bailing and is sold to other manufacturers for further use.

Thus all the waste generated in the above process is recycled, reused or sold out resulting in the maximum utilization of all the resources.

3.8 Tufted Carpets

In the manufacturing of tufted carpets waste is generated at various stages. While preparing the primary and secondary backing there is a lot of left over yarn that is a waste. Also, it may not be possible to produce the finest fabric at all times. Therefore the sub-standard fabric that is produced is a waste. The sub-standard fabric can be used for two purposes namely- packing and furniture filling. The remaining sub-standard fabric is a complete waste.



Fig 3



Fig 3 and 4: polypropylene recycling machine (taken from company's website) PP

AIIC has recently installed a polypropylene recycling machine which helps in effectively managing the left over yarn and sub-standard fabric wastes. The image above shows polypropylene recycling machine in which all the left over waste is recycled for further use. The above image was taken from the company website. The left over yarn and sub-standard fabric enters the machine from the left where it is cut into smaller pieces and then melted in order to form recycled polypropylene chips. With the use of such wonderful technology AIIC is not only able to contribute towards the environment but is also able to save a lot of cost. Practically with such affirmative techniques AIIC has reduced waste generation to near zero as most of the product is either recycled or used as by-product for the other low end applications.

3.9 Smart usage (non-woven carpet)

It is important to mention that most of the waste that is in the shape of yarn, which cannot be used otherwise, is used for

making the non-woven carpets. The yarn is cut into small pieces and then is put through the fiber making machine where it is un-intermingled and comes like a fluffy fiber. This fiber through hoppers is fed into a needle punch machine where this fiber is needle punched to form a thick fabric which is the fed with little glue to give it a bonding. The process is very simple but is very cost effective as it uses all the waste generated during the process of high end manufacturing for this low tech and low cost product.

This product is mainly used as underlays, in car mattings and also for party and functions where large open area need to be covered and cost is the constraint.

4. Conclusion

The perception of the industries all over the world is changing. The concern for environment and green development has led to the beginning of a new era where almost every activity can be effectively managed through green marketing. With such brighter views the way AIIC has adapted and taken over the responsibility towards a greener environment shows tremendous scope for other industries to follow the same. AIIC methods have given a new pathway for all carpet manufacturers to look beyond business and contribute towards the society. AIIC is the only carpet manufacturing company in the Middle East to be following such advance methods of waste management. Managing waste in carpet manufacturing has never been looked around, however carpets manufacturing has been a silent environment pollutant.

The above case has discussed how technological advancements and a sense of responsibility on the part of the manufacturers can contribute to a greener environment. It can be noted that in an era where environment protection has raised an alarming situation AIIC methods are an example for many to follow.

5. References

1. www.carpets.com
2. https://en.wikipedia.org/wiki/Green_marketing
3. <https://en.wikipedia.org/wiki/Carpet>
4. http://www.carpets.com/carpets_en/product_tufted.htm
5. https://en.wikipedia.org/wiki/Warp_and_woof
6. <http://www.carpets.com/history.htm>
7. <http://www.carpets.com/gallery.htm>
8. <http://www.textilevaluechain.com/index.php/article/technical/item/273-textiles-waste-recycling>
9. https://en.wikipedia.org/wiki/Environmental_degradation
10. <http://philipkotler2013.blogspot.in/2011/11/green-marketing>
11. Jacquelyn A. Ottman. The New Rules of Green Marketing, Berrett-Koehler Publishers, Inc., San Francisco, 2011, 17.
12. John Grant. The Marketing Manifesto, John Willey & Sons Ltd., 2007, 28.