

13. DIRECTORS' REPORT

(Prepared for the inclusion in this Prospectus)



EMAS KIARA INDUSTRIES BERHAD
Company No. 485144 H

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Tel: 603 2781 3388 Fax: 603 2781 3399

Registered Office:

Suite 13A-2, Menara Uni.Asia
1008, Jalan Sultan Ismail
50250 Kuala Lumpur

2 March 2004

The Shareholders
Emas Kiara Industries Berhad

Dear Sir/ Madam,

On behalf of the Board of Directors of Emas Kiara Industries Berhad ("EKIB"), I report after due enquiry that during the period from 31 October 2003 (being the date which the last audited accounts of EKIB Group have been made) to 2 March 2004 (being a date not earlier than 14 days before the date of issue of this Prospectus):

- (a) the business of the Company and its subsidiary companies, in the opinion of the directors has been satisfactorily maintained;
- (b) in the opinion of the directors, since the last audited financial statements of the EKIB Group, no circumstances which have adversely affected the trading or the value of the assets of EKIB Group or any of its subsidiary company have arisen;
- (c) the current assets of the EKIB Group appear in the books at values which are believed to be realisable in the ordinary course of business;
- (d) save as disclosed in Section 2.9.5 of this Prospectus, there are no contingent liabilities by reason of any guarantees or indemnities given by EKIB or its subsidiary companies;
- (e) save as disclosed in Section 2.9.4 of this Prospectus, there have been, since the last audited financial statements of the EKIB Group, all companies which forms part of the EKIB Group, no default or any known event that could give rise to a default situation, in respect of payments of either interest and/or principal sums in relation to any borrowings in which they are aware of; or
- (f) save as disclosed in Section 11.7 and 12 of this Prospectus, there have been, since the last audited accounts of the EKIB Group, no changes in the published reserves or any unusual factors affecting the profits of EKIB and its subsidiary companies.

Yours faithfully
For and on behalf of the Board of Directors
Emas Kiara Industries Berhad

Tan Sri Dato' Kamaruzzaman Bin Shariff
Executive Chairman

14. INDEPENDENT ASSESSMENT OF THE GEOSYNTHETICS INDUSTRY

(Prepared for the inclusion in this Prospectus)



VITAL FACTOR CONSULTING

Creating Winning Business Solutions

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2 March 2004

The Board of Directors
Emas Kiara Industries Berhad
Suite E-16-D, Wisma Sunrise
Plaza Mont' Kiara
No 2, Jalan Kiara
Mont' Kiara
50480 Kuala Lumpur

Dear Sirs/Madam

Independent Assessment of the Geosynthetics Industry

The following is a summary of the Independent Assessment of the Geosynthetics Industry in Malaysia prepared by Vital Factor Consulting Sdn Bhd for inclusion in the Prospectus of **Emas Kiara Industries Berhad** (herein together with all its subsidiaries will be referred to as Emas Kiara Group) in relation to its proposed listing on the Second Board of the Malaysia Securities Exchange Berhad.

1. BACKGROUND

- Emas Kiara Group is principally involved in the following business activities:
 - Manufacturing of Geosynthetic products and materials;
 - Marketing and Trading of Geosynthetic products and materials;
 - Provision of Testing, Engineering and Installation Services.
- For the financial year ended 31st December 2002, Geosynthetics contributed 89.8% of the total revenue of the Emas Kiara Group. As the manufacture of Geosynthetic products and materials is the major revenue contributor of Emas Kiara Group, the report will focus on Geosynthetic products and materials.

2. INDUSTRY OVERVIEW AND STRUCTURE

- Geosynthetic refers to sheet, strip or panel of a man-made or synthetic material that can be extruded, bonded, knitted, woven or non-woven. Geosynthetics are used with soil, rock, earth, or other Geotechnical engineering related material as an integral part of a man-made project, structure, or system.
- Geosynthetics have six primary functions namely:
 - filtration;
 - separation;
 - fluid blockage;
 - drainage;
 - reinforcement;
 - protection.
- Generally, the Geosynthetics Industry can be segmented into different types of products. The applications and end-users of each type of Geosynthetic are wide and diverse. The major types of Geosynthetics are as depicted below:

14. INDEPENDENT ASSESSMENT OF THE GEOSYNTHETICS INDUSTRY (cont'd)



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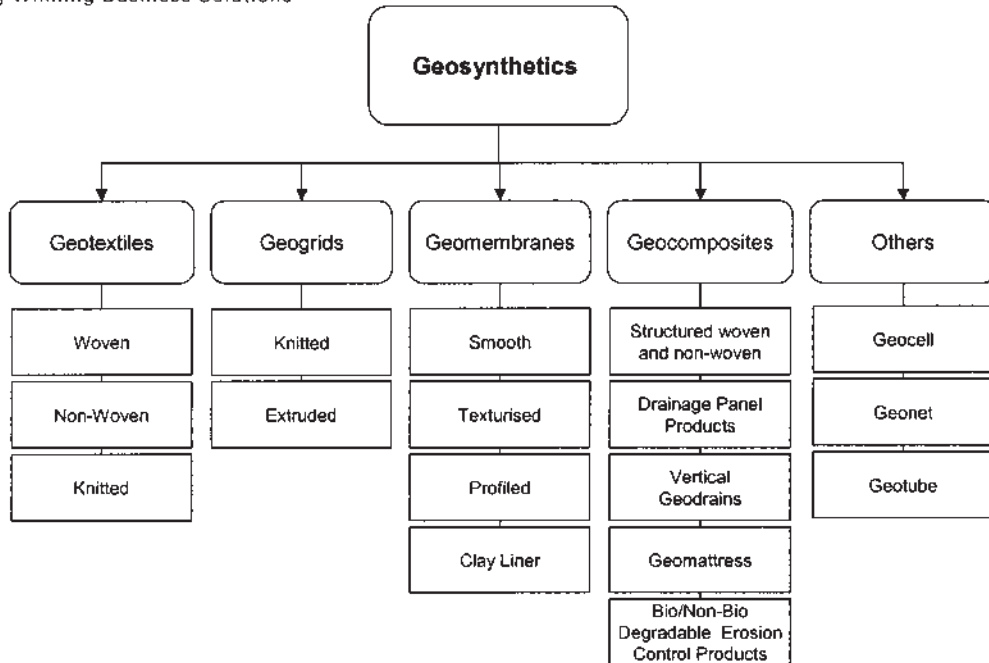


Figure 1 Geosynthetics Segmentation

- Geotextiles:** permeable Geosynthetics made of textile materials. Geotextiles can be used as filters to prevent soil migration, as drains to allow transmission of water through low permeability materials, as separators to prevent mixing of subgrade and gravel in unpaved roads, and as reinforcement to add shear strength to a soil.

Geotextiles are available in a variety of geometric and polymer compositions designed to meet a wide range of applications. It is essential that all Geotextile materials be composed of strong, durable, chemically inert polymeric materials that are resistant to the effects of ground conditions, weather and aging.

Geotextiles are segmented into different types by production processes, Woven, Non-Woven and Knitted.

Woven Geotextiles are made of filaments, fibrillated yarns, or slit films and tapes. The manufacturing process involves weaving, which incorporates the warping (machine direction) and wefting (cross-direction) of yarns. Woven Geotextiles exhibit high-tensile strength, high modulus and low elongation.

Non-woven Geotextiles are made from several layers of randomly distributed fibres that are rolled, pressed and usually interconnected by needle punching whereby the filaments are mechanically entangled by a series of small needles with barbs on its shaft, or heat-bonded in which the fibres are welded together by heat and/or pressure. Non-woven Geotextiles typically have high permeability and conformability because of the high elongation characteristics.

Knitted Geotextiles are produced by interlooping one or more fibres, yarns, filaments or other elements.

14. INDEPENDENT ASSESSMENT OF THE GEOSYNTHETICS INDUSTRY (*cont'd*)**VITAL FACTOR CONSULTING**

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- **Geogrids:** stiff or flexible net-shaped or grid-like polymeric structure, unidirectional (uniaxial Geogrids) or bidirectional (biaxial Geogrids), in the form of manufactured sheets, with large open spaces called apertures between polymer ribs. Geogrids are used for ground stabilisation and reinforcement of steep slope, wall and base layer construction.

Uniaxial Geogrids are designed to endure stress in one direction. The ribs of this variety of Geogrids tend to be thicker and the apertures are long narrow slits. This variety of grid tends to be stronger than biaxial, but can only be applied in situations where stresses occur in a single direction (unless two uniaxial grids are placed in opposite directions).

Biaxial Geogrids are designed to endure stress in two directions. The apertures are more evenly dimensioned. They are useful in situations where stresses are applied in two directions, but do not have as much tensile strength in either direction as the uniaxial Geogrid does in its direction of application.

In addition, Geogrids are a distinct group of Geosynthetics that are characterised by a relatively high tensile strength and a uniformly distributed array of large apertures (openings). The apertures allow soil particles on either side of the installed sheet to come into direct contact, thereby increasing the interaction between the Geogrid and the surrounding soils. The apertures also ensure unrestricted vertical drainage of a soil.
- **Geomembranes:** essentially impermeable materials, usually non-woven, in the form of manufactured sheets, which may be synthetic, bituminous or bentonitic. Geomembranes are used primarily as fluid barriers. Geomembranes use has increased as a result of growing concerns over the protection of valuable water resources.

Synthetic Geomembranes' main component is a synthetic polymer such as PE, PP, PVC and Ethylene Propylene Diene Terpolymer (EPDM).

Bituminous Geomembranes' main component is a bituminous compound.

Bentonitic Geomembranes' main component is bentonitic clay in powder or granule form. These Geomembranes are commonly called Geosynthetic Clay Liners (GCL). GCL are factory manufactured hydraulic barriers consisting of a layer of bentonite clay supported by Geotextiles and/or Geomembranes, which are mechanically held together by needling, stitching or chemical adhesives. Bentonite, because of its low permeability, swelling capacity, and relative abundance, is the preferred clay components of GCL. GCL are used in surface impoundments, secondary containment facilities and landfills.
- **Geocomposites:** assembled polymeric materials, in the form of manufactured sheets or strips, consisting of two or more layers of Geosynthetics and any combination of Geotextile, Geogrid, Geomembrane and other materials. Examples of Geocomposites are vertical and horizontal Geodrains, which comprise a combination of a permeable Geotextiles with an impermeable Geomembrane or polymer strip for removing water from the ground.

Some of the Geocomposites include structured woven and non-woven Geotextiles, drainage panel products, Geomattress and bio and non-bio degradable erosion control products.
- **Others:** include Geocells, Geonets and Geotubes.

14. INDEPENDENT ASSESSMENT OF THE GEOSYNTHETICS INDUSTRY (cont'd)

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3. INDUSTRY LIFE-CYCLE

- The life-cycle for the Geosynthetics Industry in Malaysia is at its **growth phase**. This is mainly predicated by the following:
 - Generally, the increased usage of Geosynthetics begin approximately 20 years ago led by the United States. In Malaysia, the use of Geosynthetics, particularly for civil engineering works only began approximately ten years ago;
 - Awareness of environmental degradation and the creation of penalties associated with violating pollution legislation have only taken place in the United States during the past 15 years. In Malaysia, concerns of environmental degradation were raised over the past 10 years. All these factors have led to the growing usage of cost-effective and reliable Geosynthetics for environmental protection;
 - Consumer awareness of the benefits of Geosynthetics in various applications is low and further consumer education effort is needed to achieve greater demand and penetration of Geosynthetics in a broader array of applications.
 - There are approximately six manufacturers of Geosynthetics in Malaysia. Of these, three are major manufacturers whilst the remaining three other manufacturers produces only small quantities of Geosynthetics.
- All the above have meant that the Geosynthetics Industry is still in the growth phase.
- As there is no specific data on local production of Geosynthetics, the following import data is used instead to provide some indications of historical performance and demand for Geosynthetics. The increase in imports for some of the sub-sectors under Geosynthetics indicates a continuing demand for some of these types of materials:
 - Between 1999 and 2003, the import value of Other Woven Fabrics obtained from Strip or the like (also sometimes referred to as PP Woven Fabrics and Geotextile Cloths) declined at an average annual rate of 13.3%. However in 2003, the import value grew by 37.0% to RM25.1 million over the previous year;
 - Import value of Other Sacks and Bags of Polyethylene or Polypropylene Strips or the like, used for the packing of goods (also sometimes referred to as PP Woven Laminated Fabrics) grew at an average annual rate of 23.5% between 1999 and 2003. In 2003, the import value grew by 80.7% amounting to RM6.3 million;
 - Import value of Needledoom Felt and Stitch-Bonded Fibre Fabrics, whether or not impregnated, coated, covered or laminated (also sometimes referred to as Non-woven Geotextiles) declined at an average annual rate of 14.9% between 1999 and 2003. Import value also declined by 18.0% to reach RM795,338 in 2003;

14. INDEPENDENT ASSESSMENT OF THE GEOSYNTHETICS INDUSTRY (*cont'd*)**VITAL FACTOR CONSULTING**

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- Between 1999 and 2003, the import value of Other Felt, whether or not impregnated, coated, covered or laminated (also sometimes referred to as Non-woven Composite Geotextiles) declined at an average rate of 0.4% per annum. In 2003, the import value decreased by 15.1% to RM355,821;
- Import value of Unbleached or Bleached Woven Fabrics of Synthetic Staple Fibres, Containing 85% or more by weight of Polyester Staple Fibres (also sometimes referred to as High Strength Woven Geotextiles) declined at an average annual rate of 14.7% between 1999 and 2003. In 2003, import value decreased by 8.6% amounting to RM1.7 million;
- Import value of Other Textile Fabrics, Felt and Felt-lined Woven Fabrics, Coated, Covered or Laminated with Rubber, Leather or Other Material, of a kind used for card clothing, and similar fabrics of a kind used for other technical purposes (also sometimes referred to as Geomattresses) grew at an average annual rate of 2.6% between 1999 and 2003. However in 2003, import value declined by 37.8% to reach RM28.1 million over the previous year;
- Import value of Articles of Yarn, Strip or the like, Twine, Cordage, Rope or Cables, not elsewhere specified or included (also referred to as High Strength Knitted Geotextiles) grew at an average annual rate of 19.3% between 1999 and 2003. However in 2003, import value of High Strength Knitted Geotextiles declined by 52.7% to reach RM2.3 million;
- Between 1999 and 2003, import value of Other Woven Fabrics from High Tenacity Yarn of Nylon or Other Polyamides or of Polyester (also sometimes known as Woven Agriculture Geotextiles) declined at an average annual rate of 13.7%. However in 2003, the import value decreased by 32.6% to reach RM40.7 million.

(Note: Full year 2003 figures are preliminary only) (Source: Department of Statistics)

4. GOVERNMENT LEGISLATION, POLICIES AND INCENTIVES

- There are no significant Government legislations or policies that impedes the growth of the Geosynthetics Industry.
- Generally, the Malaysian Government provides incentives for companies listed as promoted activities or products under the Promotion of Investments Act 1986 including:
 - Pioneer Status;
 - Investment Tax Allowance;
 - Reinvestment Allowance.

(Source: Malaysian Industrial Development Authority)

- The manufacture of Geosynthetics is listed as a promoted activity product classified under Plastic Products for Engineering Use, within the overall category of Manufacture of Plastic Products. As such, the manufacture of Geosynthetics is eligible for consideration under Pioneer Status and Investment Tax Allowance in the Promotion of Investments Act 1986.

14. INDEPENDENT ASSESSMENT OF THE GEOSYNTHETICS INDUSTRY (cont'd)

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5. LABOUR USAGE

- According to the revised Malaysia Standard Industrial Classification, the manufacturing of Geosynthetics is classified under the Manufacturing of Plastic Products, not elsewhere classified (*Source: Department of Statistics*).
- This segment is large comprising Geosynthetics as well as other plastic products. As such, discussions here are merely indicative.
- The usage of labour in the manufacture of Plastic Products, not elsewhere classified is more intensive compared to the Overall Manufacturing Industry. This is supported by the following:

	Sales Per Employee 2002 RM
Overall Manufacturing Industry	316,892
Manufacture of Plastic Products, not elsewhere classified	117,993

Source: Monthly Manufacturing Statistics, October 2003, Department of Statistics

Figure 2 Sales per Employee of Selected Industries

- In comparison to Overall Manufacturing Industry, the manufacture of Plastic Products, not elsewhere classified, utilised approximately 2.7 times more labour for each Ringgit of sales generated.

6. SUPPLY**6.1 Production**

- Specific data on the manufacture of Geosynthetics are not available because of the small number of manufacturers operating within the Industry.
- As such, data on Plastic Products, not elsewhere classified, is used to provide an indication of the performance of the Geosynthetics Industry (*Source: Department of Statistics*).
- Between 1998 and 2002, sales value of Plastic Products, not elsewhere classified, grew at an average annual rate of 15.3% (*Source: Monthly Manufacturing Statistics, October 2003, Department of Statistics*).
- In 2002, sales value of this type of Plastic Products increased by 9.4% amounting to RM8.0 billion (based on a sample of companies with 30+ employees) (*Source: Monthly Manufacturing Statistics, October 2003, Department of Statistics*).
- Between January and October 2003, sales value of this type of Plastic Products increased by 8.4% amounting to RM7.2 billion (*Source: Monthly Manufacturing Statistics, October 2003, Department of Statistics*).

14. INDEPENDENT ASSESSMENT OF THE GEOSYNTHETICS INDUSTRY (cont'd)

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6.2 Imports

- Between 1999 and 2003, the import value of Other Woven Fabrics obtained from Strip or the like (also sometimes referred to as PP Woven Fabrics and Geotextile Cloths) declined at an average annual rate of 13.3%. In 2003, the import value of Other Woven Fabrics obtained from Strip or the like, grew by 37.0% to RM25.1 million.
- Import value of Other Sacks and Bags of Polyethylene or Polypropylene Strips or the like, used for the packing of goods (also sometimes referred to as PP Woven Laminated Fabrics) grew at an average annual rate of 23.5% between 1999 and 2003. Import value grew by 80.7% amounting to RM6.3 million in 2003.
- Import value of Needledoom Felt and Stitch-Bonded Fibre Fabrics, whether or not impregnated, coated, covered or laminated (also sometimes referred to as Non-woven Geotextiles) declined at an average annual rate of 14.9% between 1999 and 2003. In 2003, import value of this type of material also declined by 18.0% to reach RM795,338.
- Between 1999 and 2003, the import value of Other Felt, whether or not impregnated, coated, covered or laminated (also sometimes referred to as Non-woven Composite Geotextiles) declined at an average rate of 0.4% per annum. In 2003, the import value of Other Felt, whether or not impregnated, coated, covered or laminated (also sometimes referred to as Non-woven Composite Geotextiles) decreased by 15.1% to RM355,821.
- Import value of Unbleached or Bleached Woven Fabrics of Synthetic Staple Fibres, Containing 85% or more by weight of Polyester Staple Fibres (also sometimes referred to as High Strength Woven Geotextiles) declined at an average annual rate of 14.7% between 1999 and 2003. In 2003, import value of Unbleached or Bleached Woven Fabrics of Synthetic Staple Fibres, Containing 85% or more by weight of Polyester Staple Fibres (also sometimes referred to as High Strength Woven Geotextiles) decreased by 8.6% to reach RM1.7 million.
- In 2003, import value of Other Textile Fabrics, Felt and Felt-lined Woven Fabrics, Coated, Covered or Laminated with Rubber, Leather or Other Material, of a kind used for card clothing, and similar fabrics of a kind used for other technical purposes (also sometimes referred to as Geomattresses) declined by 37.8% to reach RM28.1 million. However, import value of this category grew at an average annual rate of 2.6% between 1999 and 2003.
- Between 1999 and 2003, import value of Articles of Yarn, Strip or the like, Twine, Cordage, Rope or Cables, not elsewhere specified or included (also sometimes referred to as High Strength Knitted Geotextiles) grew at an average annual rate of 19.3%. In 2003, import value of Articles of Yarn, Strip or the like, Twine, Cordage, Rope or Cables, not elsewhere specified or included (also sometimes referred to as High Strength Knitted Geotextiles) declined by 52.7% to reach RM2.3 million
- Between 1999 and 2003, import value of Other Woven Fabrics from High Tenacity Yarn of Nylon or Other Polyamides or of Polyester (also sometimes referred to as Woven Agriculture Geotextiles) declined at an average annual rate of 13.7%. In 2003, the import value decreased by 32.6% amounting to RM40.7 million.

(Note: Full year 2003 figures are preliminary only) (Source: Department of Statistics)

14. INDEPENDENT ASSESSMENT OF THE GEOSYNTHETICS INDUSTRY (cont'd)

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7. SUPPLY DEPENDENCIES – RAW MATERIALS

- The major raw materials required for the manufacturing of Geosynthetics are primarily:
 - plastic resins;
 - fibres;
 - yarns.

7.1 Resins

- Plastic resin is the primary raw materials used in the manufacturing of Geosynthetics. The types of resins generally used for Geosynthetics manufacturing are Polypropylene (PP), Polyethylene Terephthalate (PET) and High Density Polyethylene (HDPE). These resins are locally available in Malaysia.
- In 2002, production capacities for some of the plastic resins in Malaysia are depicted in the following table:

Resins	Capacity
PE (include LLDPE and HDPE)	1,000,000
Polypropylene	410,000
PET	30,000

Source: Malaysian Plastics Manufacturers Association

Figure 3 Capacity of Various Types of Resins

- In 2002, the sales value of Synthetic Resins, Plastic Materials and Man-made Fibre except glass increased by 9.6% to RM5.8 billion. (Note: Based on a sample of companies with 30+ employees) (Source: Monthly Manufacturing Statistics, October 2003, Department of Statistics).
- Between 1999 and 2002, sales value of PE increased at an average annual rate of 17.7%. In 2002, the sales value of PE increased by 98.0% amounting to RM1.6 billion (Source: Department of Statistics).
- Between January and October 2003, the sales value of PE grew by 13.0% over the same period in 2002, amounting to approximately RM1.5 billion (Source: Department of Statistics).
- Between 1999 and 2003, import value of HDPE grew at an average annual rate of 4.9%. In 2003, the import value of HDPE decreased by 6.2% amounting to RM298.6 million (Source: Department of Statistics).
- Between 1998 and 2002, import value of PP grew at an average annual rate of 24.6%. In 2002, the import value of PP increased by 26.4% amounting to RM160.3 million (Note: Full year 2003 figures are preliminary only) (Source: Department of Statistics).

14. INDEPENDENT ASSESSMENT OF THE GEOSYNTHETICS INDUSTRY (cont'd)

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7.2 Fibres and Yarns

- Secondary raw materials used in the production of Geosynthetics include fibres and yarns of PP and PET.
- There is no data available on local production of fibres and yarns made from PP and PET resins due to the small number of establishments. Hence, data on import of fibres and yarns of PP are used to assess the supply of such materials.
- In 2003, the import value of Synthetic Staple Fibres of Polypropylene, Not Carded, Combed or Otherwise Processed for Spinning (including PP Staple Fibres) decreased by 22.7% amounting to RM20.6 million. The import value of these types of materials grew at an average annual rate of 5.3% between 1999 and 2003.
- Between 1999 and 2003, the import value of Synthetic Staple Fibres of Polyesters, Not Carded, Combed or Otherwise Processed for Spinning (including Polyester Staple Fibres) declined at an average annual rate of 21.2%. In 2003, the import value increased by 21.7% over the previous year, amounting to RM41.1 million.
- Between 1999 and 2003, import value of Synthetic filament yarn (other than sewing thread) of High Tenacity of Polyesters, not put up for retail sale, including synthetic monofilament of less than 67 decitex (including PET Filament Yarns (high tenacity)) increased at an average annual rate of 32.5%. In 2003, the import value increased to RM31.9 million.

(Note: Full year 2003 figures are preliminary only) (Source: Department of Statistics)

8. DEMAND AND DEMAND DEPENDENCIES

- The Geosynthetics Industry supports the development of infrastructure and construction developments in the country. The increasing awareness of environmental aspect towards these developments have led to the wide usage of Geosynthetics, replacing conventional methods such as the use of cement and concrete, to protect and conserve the environment as well as the structure of construction.
- The applications of Geosynthetics are extensive and diverse. Some of the major end-user sectors of Geosynthetics include the following:
 - infrastructure development
 - building and construction
 - general civil engineering construction
 - bridge construction
 - road and pavement construction
 - irrigation and flood control system
 - railway track construction
 - slope and coastal protection system
 - soil stabilisation
 - landscaping
 - underwater construction work
 - reclamation work
 - airport construction
 - waste containment system
 - industrial applications (examples, liquid filters and shoe lining).

14. INDEPENDENT ASSESSMENT OF THE GEOSYNTHETICS INDUSTRY (*cont'd*)**VITAL FACTOR CONSULTING**

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- The growth performance of end-user sectors of the Geosynthetics Industry will create demand for Geosynthetics, which are used for environmental protection including soil separation, filtration, slope protection and subsurface drainage. Hence this will provide greater business opportunities for operators within the Geotextile Industry.
- In 2002, growth in the Construction Industry maintained at 3.1%. Growth was supported mainly by higher Government expenditure on infrastructure projects and household demand for residential property (*Source: Monthly Statistical Bulletin, November 2002, Bank Negara Malaysia*).
- In 2000, value of gross output of the Construction sector amounted to RM39.9 billion (*Source: Census of Construction Industries 2001, Department of Statistics*).
- Within the Construction Sector, Civil Engineering contributed 36.3% of total value of gross output amounting to RM14.5 billion in 2000 (*Source: Census of Construction Industries 2001, Department of Statistics*).

9. **COMPETITIVE NATURE AND INTENSITY**

- The Geosynthetics Industry operates under **normal** competitive conditions.
- There are approximately three major manufacturers of Geosynthetics, and an additional three other manufacturers that produce small quantities of Geosynthetics in Malaysia. In addition, there are approximately 20 other companies that import Geosynthetics.
- Competition within the Geosynthetics Industry in Malaysia is **moderate** based on the following observations.

Factors that Increase Competitive Intensity

- The Geosynthetics Industry in Malaysia faces some competition from imports of Geosynthetics. In 2002, the value of Geosynthetic imports amounted to approximately RM370 million (*Note: This is an estimate only as many of the classifications of Geosynthetic fabrics are very similar to fabrics for apparels.*) (*Source: Department of Statistics*).
- In Malaysia, there are approximately six manufacturers of Geosynthetics, creating a competitive environment.
- Operators within the Geosynthetics Industry also face some competition from substitute products in terms of materials, which are used for identical applications such as strengthening soft or weak soils during construction of roads, airports and industrial parks. In some cases, different engineering systems may be used as substitutes, for example conventional methods including use of piling, concrete structures, stone columns, sand columns, gabions and thicker layer of sub-grades for road base to provide strength.

Factors that Moderate Competitive Intensity

- The large amount of imports of Geosynthetics indicates demand for Geosynthetics in Malaysia and thus presenting a vast potential for import substitution by local operators within the Geosynthetics Industry.

 14. INDEPENDENT ASSESSMENT OF THE GEOSYNTHETICS INDUSTRY (cont'd)


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- Conventional methods or systems which are made of specially graded sands, gravels, stones and concretes are subjected to variations caused by weather, handling and placement and also the high cost of production deriving from limited natural resources. Geosynthetics is still the most viable in terms of durability and cost-effectiveness material used for environmental conservation and structural protection.
- Alternatives to Geosynthetics, for example conventional methods including use of piling, concrete structures, stone columns, sand columns, gabions and thicker layer of sub-grades for road base to provide strength, may not be as cost-effective and may take a significantly longer time to achieve the desired results.
- Manufacturers that are vertically integrated and focused on value-adding to Geosynthetics or provide customised solutions, face less competition compared to manufacturers of generic and standardised Geosynthetics.

10. KEY PLAYERS IN THE INDUSTRY

- In June 2003, there were approximately six manufactures of Geosynthetics:
 - Emas Kiara Group (through its subsidiaries Emas Kiara Sdn Bhd and Khidmat Edar (M) Sdn Bhd)
 - Polyfelt Asia Sdn Bhd;
 - Tego Sdn Bhd.
 - Nylex (Malaysia) Berhad;
 - Nonwoven Products Industries (M) Sdn Bhd;
 - Star Art Corporation Sdn Bhd.

(Source: Primary Market Research undertaken by Vital Factor Consulting Sdn Bhd)

11. BARRIERS TO ENTRY

- Generally, barriers to entry into the Geosynthetics Industry are **moderate**. This is substantiated by the fact that there are approximately six manufacturers of Geosynthetics in Malaysia.
- The main barriers to entry are:
 - capital and set-up costs;
 - technical skills;
 - track record.

11.1 Capital and Set-up Costs

- The barriers to entry into the manufacture of Geosynthetics based on capital requirements (excluding land and building) are **moderate to high**.
- At the basic level, high capital outlay is required for the purchase of major machineries for weaving, knitting, needle punching of fibres and yarns to manufacture Geosynthetics.

14. INDEPENDENT ASSESSMENT OF THE GEOSYNTHETICS INDUSTRY (*cont'd*)**VITAL FACTOR CONSULTING**

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- The capital costs of starting-up a small to medium size manufacturing plant are as follows:

Production of Woven Geotextiles and Geogrids

- RM2 million for 2 units of weaving machines;
- RM3.5 million for 1 unit of warping and assembly machine;
- RM2.5 million for 1 unit of knitting machine;
- RM0.5 million for 1 unit of oven used for Geogrid production;
- RM1 million for testing equipment;
- RM2 million for working capital.

The above mentioned capital set-up and working capital with an estimated total cost of RM11.5 million could generate a revenue of RM22 million per annum (*Source: Emas Kiara Group*).

Production of Non-woven Geotextiles

- RM4 million for 1 unit of needle punching machine;
- RM1.5 million for 1 unit of oven;
- RM1.5 million for 1 unit of opening machine;
- RM1.5 million for 1 unit of carding machine;
- RM1 million for testing equipment;
- RM1.5 million for working capital.

The above-mentioned capital set-up and working capital with an estimated total cost of RM11 million could generate a revenue of RM14 million per annum.

- Capital costs start to escalate for larger operations to enable greater economies of scale. Larger operations are necessary to meet the demands from export countries in terms of requirements for higher volume of production.

11.2 Technical Skills

- The manufacture of Geosynthetics is somewhat different from the average manufacturing companies that focus on mass manufacturing. Manufacturing of Geosynthetics is more customised and often requires a different set of properties and specifications for each project.
- Thus, there is a need for technical skills in understanding the requirements of each project, and to be able to manufacture products to specifications.
- In addition, civil engineering knowledge would be essential as prerequisites to commence a business of this nature.
- Experience is also critical for technical personnel to clearly understand all the parameters of the project as well as devising optimum solutions to ensure cost-effective products and at the same time profitability for the Geosynthetic manufacturer.
- Product knowledge and technical expertise are also crucial in the blending of the raw materials and other formulations to provide the required characteristics or properties in Geosynthetics.

 14. INDEPENDENT ASSESSMENT OF THE GEOSYNTHETICS INDUSTRY (*cont'd*)

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- Experienced and trained workers with electronic or mechanical background are also required in the operation of machinery and equipment to conduct product testing and optimise the level of productivity.
- Furthermore, some form of research and development is necessary. Skilled and experienced staff with the ability to develop new designs and products would enable manufacturers to maintain their competitive advantage by keeping abreast with changing preferences, engineering trends as well as environmental factors.

11.3 Track Record

- Track record also forms one of the barriers to entry for new entrants. As Geosynthetics are technical products being used in major projects, customers must have some assurance of the quality and practicality of the products. This is especially critical for areas of new applications using highly customised products. As such, manufacturers that has strong track record would have a significant advantage in winning contracts.
- More importantly, track record would enable the manufacturer to use past projects as reference sites to win new customers.
- Track record is also a requirement for operators that obtained sales orders through recommendations from main contractors of government or private entity tender contracts. Main contractors when tendering for projects prefer operators that have proven track record in successively delivering quality and reliable products, in addition to meeting the stringent tests and internationally accredited standards such as International Standard Organisation (ISO), American Society for Testing and Materials (ASTM) and British Standards (BS).
- Thus new entrants would find it difficult to gain immediate access into the market without any proven track record.

12. BARRIERS TO EXIT

- Barriers to exit for the manufacturing of Geosynthetics are **high**.
- This is because of the relatively few number of manufacturers, estimated at six manufacturers in Malaysia, within the Geosynthetics Industry.
- For manufacturers with large machineries, the cost of exit is even higher as there are only three major players with a turnover of RM30 million or more in Malaysia.
- Small manufacturers are not likely to purchase the larger capacity machineries because these machineries are required to be run on a 24-hour day basis. Without the volume of demand, a large machine for a small manufacturer would not be economically viable.

14. INDEPENDENT ASSESSMENT OF THE GEOSYNTHETICS INDUSTRY (*cont'd*)**VITAL FACTOR CONSULTING**

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13. INDUSTRY OUTLOOK AND GROWTH FORECAST

- The outlook of the Geosynthetics Industry is highly dependent on the user industries, particularly building and construction, and infrastructure.
- The following factors and observations in imports, exports, end-user industries and government allocations provide some indications of the outlook of the industry.

13.1 Imports

- As there are no local production figures to show trending, imports are used instead to provide some indications of historical growth and demand for Geosynthetics. Imports are relatively good indicators of the performance of the local Geosynthetics Industry as local production is relatively low due to the fact that there are only three major producers and three smaller players within the Geosynthetics Industry.
- Between 1999 and 2003, the import value of Other Woven Fabrics obtained from Strip or the like (also sometimes referred to as PP Woven Fabrics and Geotextile Cloths) declined at an average annual rate of 13.3%. In 2003, the import value grew by 37.0% to RM25.1 million over the previous year.
- Import value of Other Sacks and Bags of Polyethylene or Polypropylene Strips or the like, used for the packing of goods (also sometimes referred to as PP Woven Laminated Fabrics) grew at an average annual rate of 23.5% between 1999 and 2003. In 2003, the import value grew by 80.7% amounting to RM6.3 million.
- Import value of Needledoom Felt and Stitch-Bonded Fibre Fabrics, whether or not impregnated, coated, covered or laminated (also sometimes referred to as Non-woven Geotextiles) declined at an average annual rate of 14.9% between 1999 and 2003. Import value declined by 18.0% to reach RM795,338 in 2003.
- Between 1999 and 2003, the import value of Other Felt, whether or not impregnated, coated, covered or laminated (also sometimes referred to as Non-woven Composite Geotextiles) declined at an average rate of 0.4% per annum. In 2003, the import value decreased by 15.1% to RM355,821.
- Import value of Unbleached or Bleached Woven Fabrics of Synthetic Staple Fibres, Containing 85% or more by weight of Polyester Staple Fibres (also sometimes referred to as High Strength Woven Geotextiles) declined at an average annual rate of 14.7% between 1999 and 2003. In 2003, import value decreased by 8.6% amounting to RM1.7 million.
- In 2003, import value of Other Textile Fabrics, Felt and Felt-lined Woven Fabrics, Coated, Covered or Laminated with Rubber, Leather or Other Material, of a kind used for card clothing, and similar fabrics of a kind used for other technical purposes (also sometimes referred to as Geomattresses) declined by 37.8% to reach RM28.1 million over the previous year. However, import value grew at an average annual rate of 2.6% between 1999 and 2003.

14. INDEPENDENT ASSESSMENT OF THE GEOSYNTHETICS INDUSTRY (*cont'd*)**VITAL FACTOR CONSULTING**

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- Import value of Articles of Yarn, Strip or the like, Twine, Cordage, Rope or Cables, not elsewhere specified or included (also referred to as High Strength Knitted Geotextiles) grew at an average annual rate of 19.3% between 1999 and 2003. In 2003, import value declined by 52.7% to reach RM2.3 million.
- Between 1999 and 2003, import value of Other Woven Fabrics from High Tenacity Yarn of Nylon or Other Polyamides or of Polyester (also sometimes known as Woven Agriculture Geotextiles) declined at an average annual rate of 13.7%. In 2003, the import value decreased by 32.6% to reach RM40.7 million.

(Note: Full year 2003 figures are preliminary only) (Source: Department of Statistics)

13.2 Exports

- Export value of Needledoom Felt and Stitch-Bonded Fibre Fabrics, whether or not impregnated, coated, covered or laminated (also sometimes referred to as Non-woven Geotextiles) declined at an average annual rate of 49.4% between 1999 and 2003;
- Export value of Other Sacks and Bags of Polyethylene or Polypropylene Strips or the like, used for the packing of goods (also sometimes referred to as PP Woven Laminated Fabrics) declined at an average annual rate of 12.2% between 1999 and 2003;
- Export value of the Other Felt, whether or not impregnated, coated, covered or laminated (also sometimes referred to as Non-woven Composite Geotextiles) increased at an average annual rate of 5.7% between 1998 and 2002;
- Export value of Other Woven Fabrics obtained from Strip or the like (also sometimes referred to as PP Woven Fabrics and Geotextile Cloths) declined at an average annual rate of 69.4% between 1998 and 2002;
- Export value of Unbleached or Bleached Woven Fabrics of Synthetic Staple Fibres, Containing 85% or more by weight of Polyester Staple Fibres (also sometimes referred to as High Strength Woven Geotextiles) decreased at an average annual rate of 52.7% between 1999 and 2003;
- Between 1999 and 2003, the export value of Other Textile Fabrics, Felt and Felt-lined Woven Fabrics, Coated, Covered or Laminated with Rubber, Leather or Other Material, of a kind used for card clothing, and similar fabrics of a kind used for other technical purposes (also sometimes referred to as Geomattresses) declined by an average annual rate of 1.8%;
- Export value of Articles of Yarn, Strip or the like, Twine, Cordage, Rope or Cables, not elsewhere specified or included (also referred to as High Strength Knitted Geotextiles) grew at an average annual rate of 50.7% between 1999 and 2003;
- Export value of Other Woven Fabrics from High Tenacity Yarn of Nylon or Other Polyamides or of Polyester (also sometimes known as Woven Agriculture Geotextiles) declined at an average annual rate of 18.9% between 1999 and 2003.

(Note: Full year 2003 figures are preliminary only) (Source: Department of Statistics)

14. INDEPENDENT ASSESSMENT OF THE GEOSYNTHETICS INDUSTRY (cont'd)

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Implication

- Export performances over the last five years indicates mixed results. However, with the relatively few local manufacturers and the relatively higher imports, any decline in exports could be due to a decrease in re-exports.

13.3 End-User Industries

- The Construction Industry grew at an average annual rate of 0.2% between 1998 and 2002 (Source: *Monthly Statistical Bulletin, November 2003, Bank Negara Malaysia*);
- Between 1994 and 1998, the Civil Engineering Construction sector experienced an average growth rate of 8.6% per annum (Source: *Census of Construction Industries 1995, 1997 and 1999, Department of Statistics*);
- Between 1996 and 2000, solid waste generation, as one of the user-industries, grew at an average rate of 20.1% per annum (Note: 2000 figures are estimates only) (Source: *Eighth Malaysia Plan 2001 – 2005, Economic Planning Unit, Prime Minister's Department*).

Implication

- Generally, the continuing growth in the construction industry and civil engineering works in particular would provide growth opportunities to the Geosynthetics Industry.

13.4 Government Allocations

- The outlook for the Geosynthetics Industry is also dependent on Government allocations.
- As such, the outlook of the industry is encapsulated within the Eighth Malaysia Plan based on allocation of government funds and investments by the private sector as follows:
 - RM5.1 billion will be allocated for the development of new roads;
 - RM8.9 billion will be allocated for the improvement and upgrading of existing roads;
 - RM3.5 billion will be invested on roads by the private sector;
 (Source: *Eighth Malaysia Plan 2001 – 2005, Economic Planning Unit, Prime Minister's Department*).
- Growth within the Eighth Malaysia Plan for road developments will amount to 2.6% per annum based on the difference between the allocation of RM14.0 billion for the Eighth Malaysia Plan and the RM12.3 billion being the amount spent during the Seventh Malaysia Plan by the Government. (Source: *Eighth Malaysia Plan 2001 – 2005, Economic Planning Unit, Prime Minister's Department*).
- On the 21st May 2003, the Government announced a RM7.3 billion Stimulus Package aimed at mitigating some of the adverse impact brought about by external factors including the Iraq war and the outbreak of Severe Acute Respiratory Syndrome (SARS). The Package, which focuses on four main strategies comprising 90 measures, aims at stimulating economic activities by mobilising domestic sources of growth and, at the same time, reducing dependency on the external sector. This will

14. INDEPENDENT ASSESSMENT OF THE GEOSYNTHETICS INDUSTRY (cont'd)


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help ensure Malaysia's economic fundamentals remain strong in the medium and long term

- One of the 90 measures is the Government allocation of RM300 million to improve the infrastructure and delivery system in rural areas aimed at stimulating rural economic activities.
- Another measure is that the Government will continue to undertake development projects whereby priorities will be given to infrastructure and construction related projects, which will have a multiplier effect on the economy.

14. DRIVERS OF GROWTH

- Some of the drivers of growth for the Geosynthetics Industry are:
 - The Malaysian Government's continuing focus to undertake infrastructure and development projects will continue to generate demand for Geosynthetics;
 - Economic development, and demographic changes such as population growth, improving per capita Gross National Product (GNP) and household incomes, will, in turn continue to influence and stimulate demand for housing and transportation services. This will ultimately increase business opportunities for operators within the Geosynthetics Industry;
 - Increasing urbanisation towards achieving the objective of balanced development would result in a need for more systematic planning and better provision of infrastructure and utilities, and increased building and construction activities. Thus, increasing urbanisation will increase demand for Geosynthetic products.
 - Growth in end-user industry sectors among others, including waste management, building and construction, reclamation works, irrigation and flood control will inadvertently generate demand for Geosynthetics;
 - Growth in the economies and infrastructure development in overseas countries will also continue to generate export market demand for Geosynthetics.

15. THREATS AND RISK ANALYSIS
15.1 Implementation of Asean Free Trade Area

- The reduction of import duties to 0% and 5% with the implementation of Asean Free Trade Area (AFTA) through Common Effective Preferential Tariff (CEPT) would make imports very competitive against locally manufactured products.
- CEPT is the mechanism by which tariffs on goods traded within the Asean region, which meet a 40% Asean content requirement, will be subjected to a reduction of the above-mentioned range of tariff by 2003 (2006 for Vietnam, 2008 for Laos and Myanmar).

 14. INDEPENDENT ASSESSMENT OF THE GEOSYNTHETICS INDUSTRY (*cont'd*)

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- Thus the implementation of AFTA would make imports competitive against locally manufactured Geosynthetics.

Mitigating Factors

- The following mitigating factors apply to manufacturers that focus primarily on the local market.
- New entrants into the Malaysian market upon the implementation of AFTA would need to invest significant effort and time to develop and market their products to gain acceptance from local consumers. This would provide some advantages to existing local players at least in the short to medium term.
- Local players with good track record, established integrated distribution and wide range of products would be in a better position to face the increased competitive pressure from the potential new players in the market.
- In addition, a significant proportion of the requirements of Geosynthetics require customisation. As such, manufacturers that are located in Malaysia would have an advantage as local manufacturers can liaise closely with customers and undertake prototyping and testing to meet customers' technical specifications.
- Currently, some of the raw materials as in staple fibres are subjected to import duties of 5%. With the implementation of AFTA and the subsequent reduction or removal of duties, it may compel local producers to be more cost competitive and imports of raw materials to be cheaper. From this perspective, the implementation of AFTA would benefit local manufacturers within the Geosynthetics Industry

15.2 Use of Alternative Products and Systems

- There are various different types of substitutes for Geosynthetic products and materials and this comes in different forms and types of materials and engineering systems.
- As for types of materials, specially graded sands and gravels or other types of materials may be used as substitutes.
- In some cases, different engineering systems or methods may be used as substitutes. Some examples include the following:
 - for soil consolidation, piling may be used instead of Vertical Geodrains;
 - for slope stabilisation, gabions may be used instead of Geogrids;
 - for a variety of situations, concrete structures, stone columns and sand columns may be used instead of Geotextiles and Geogrids;
 - for road construction, thicker layer of sub-grade may be used instead of Geotextiles to provide stronger road-base and even distribution of load.

Mitigating Factors

- There are not many viable alternatives to Geosynthetics that can provide similar advantages in permeability, strength, lightness, durability and cost competitiveness. The probability of other materials replacing Geosynthetics is low due to the low cost of plastic raw materials as well as the low cost of mass production.

14. INDEPENDENT ASSESSMENT OF THE GEOSYNTHETICS INDUSTRY (cont'd)

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- In reality, Geosynthetics have replaced many other types of materials, especially cement and concrete for applications such as ground stabilisation and reinforcement.
- Geosynthetics is still the most viable material in terms of biodegradability, durability and cost-effectiveness for applications relating to environmental conservation and structural protection compared to cement and concrete.

15.3 Fluctuations in Prices of Raw Materials

- Plastic resin is the main raw material used for the production of Geosynthetics. As plastic resin is a commodity, manufacturers are therefore subjected to fluctuations in world prices. In some situations, increases in the price of raw materials are not easily passed onto users. This could impact on the margin or alternatively, if the increase in cost is passed onto users, the manufacturer may not be price competitive against alternative solutions.

Mitigating Factors

- Manufacturers with strong financial stability are able to hold stocks of this raw material to cushion against fluctuations in prices.
- As Plastic resin is a commodity and therefore subjected to world prices, all manufacturers that use this material are equally affected.

15.4 Over-dependency on Imported Fibres and Yarns

- Although Malaysia has its own supply of fibres and yarns, most of the locally produced fibres and yarns are catered to the use of the Textiles and Apparel Industry. These locally produced fibres and yarns are often not suitable to be used as raw materials for the production of Geosynthetics.
- Currently, there are only a few established local Geosynthetic producers, hence the capacity of local production of yarns and fibres is small and the range of products available is limited.
- Thus, a significant amount of fibres and yarns are imported to meet the demand for the manufacture of Geosynthetics.

Mitigating Factors

- Geosynthetic manufacturers that also produce fibres and yarns are in an advantageous position to reduce dependency on imported raw materials and thus lessen its exposure to foreign exchange risk.
- Currently, Emas Kiara Group produces Polypropylene (PP) fibres for its production of non-woven Geotextiles. The Group also have plans to commence the production of Polyester fibres. This upstream vertical integration has enabled the Group to become self-sufficient in terms of raw material supply.
- In addition, fibres and yarns are commodity items and are available in many overseas countries. The likelihood of a world shortage is low.

14. INDEPENDENT ASSESSMENT OF THE GEOSYNTHETICS INDUSTRY (cont'd)


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16. AREAS OF GROWTH AND OPPORTUNITIES
16.1 Product Innovations in Applications

- Product innovation has the ability to create new usage and applications to address new markets. More importantly, this could win market segments from alternative materials.
- Some of the more recent product innovations of Geosynthetics have been in the combination of differing materials to produce unique Geosynthetics. These products, among others, include:
 - waterproofing membranes;
 - heavy-duty repair membranes.
- The waterproofing membrane is made from non-woven fabric coated with asphalt cement and rubberised adhesive mastic. The adhesive mastic easily bonds to the existing pavement surface, allowing for quick installation. The asphalt coating on the non-woven fabrics ensures bonding with the pavement overlay. Thus these membranes are effective for repair of pavement cracks and joints.
- The heavy-duty repair membranes' uniqueness lies in the water-resistant asphalt sandwiched between a non-woven and a high-modulus woven fabric. These membranes with high-tensile strength and resistance to delamination are used to absorb and dissipate pavement stresses that cause reflective cracking.
- Thus, these product innovations could provide areas of opportunities for business growth.

16.2 Creation of Original Design and Brand Manufacturing

- With the competitive pressure from imported Geosynthetics, the creation of original design and branding of Geosynthetic products can provide a sustainable differentiation from competition.
- Branded products with designs that are unique, adaptable with the geographical aspects in its intended place of usage, and adhere to international accredited standards will create product differentiation to compete against imported Geosynthetics.

16.3 Overseas Markets

- There are opportunities for Malaysian operators to export Geosynthetics in developing countries.
- Besides the dominant export markets, other export markets particularly in countries that resembles Malaysia in terms of climate and infrastructure development will provide significant growth opportunities for the export of Geosynthetics.
- Operators that can serve various markets will have increased areas of opportunities for growth as well as diversification in business risks.

 14. INDEPENDENT ASSESSMENT OF THE GEOSYNTHETICS INDUSTRY (cont'd)

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17. CRITICAL SUCCESS FACTORS

- The critical success factors for manufacturers in the Geosynthetics Industry include:
 - **Quality of Finished Products:** To ensure business sustainability, manufacturers must be able to continually meet and deliver quality products to customers. Those who adopt stringent controls and testing procedures in their manufacturing processes and have attained internationally recognised accreditations, such as International Standard Organisation (ISO), American Society for Testing and Materials (ASTM) and British Standards (BS) reflect their commitment to excellence and are in a better position to meet customers' requirements.
 - **Established Track Record:** An established track record is crucial because of the following reasons:
 - Geosynthetics are used for soil erosion control, stabilisation and reinforcement to safeguard the construction structure and protect the environment. Thus the consistency in producing reliable, safe and quality products is paramount in sustaining existing customer base;
 - Generally, sales orders for Geosynthetics are obtained through recommendations from main contractors of government or private entity tender contracts. Geosynthetic products that have successfully undergone stringent quality tests to obtain internationally recognised certifications are likely to win new or renewal contracts.
 - **Flexible Product Solutions:** The ability to provide customised solutions is critical as most projects consist of differing sets of standards and requirements due to varying geographical set-up. Geosynthetic manufacturers that have the flexibility to modify products and offer a wide range of solutions are likely to serve a wider range of end-user sectors.
 - **Financial Stability:** Manufacturers in a healthy financial position are more likely to retain and attract new customers. Potential customers would emphasise financial stability as a key criterion in the evaluation of a prospective contract manufacturer as they would not want any disruption in the supply of products. A financially strong manufacturer would be in a better position to upgrade its manufacturing capabilities, if necessary, to keep abreast with technology, changes in manufacturing or to meet future demand for increased capacity.

Financial strength is also crucial for manufacturers to be able to buy in bulk during periods of low raw material prices to minimise the impact of future price rises. As most raw materials in terms of plastic resins are commodity items, price fluctuations can be significant.

14. INDEPENDENT ASSESSMENT OF THE GEOSYNTHETICS INDUSTRY (*cont'd*)



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18. MARKET POSITIONING, SIZING AND SHARE

- Based on turnover for the manufacture of Geosynthetic products, Emas Kiara Group ranked **first** among operators within the manufacturing of Geosynthetic products in 2002.
- In 2002, the market size for Geosynthetic Products in Malaysia was estimated at **RM400 million** (*Source: Department of Statistics and Vital Factor Consulting Sdn Bhd*).
- In 2002, Emas Kiara Group's **market share** of Geosynthetic Products in Malaysia was estimated at **13%**.

Vital Factor Consulting Sdn Bhd has prepared this report in an independent and objective manner and has taken all reasonable consideration and care to ensure the accuracy and completeness of the report. It is our opinion that the report represents a true and fair assessment of the industry within the limitations of, among others, secondary statistics and information, and primary market research. Our assessment is for the overall industry and may not necessarily reflect the individual performance of any company. We do not take any responsibilities for the decisions or actions of readers of this document. This report should not be taken as a recommendation to buy or not to buy the shares of any company.

Yours sincerely

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