



CHAPTER I

INTRODUCTION

From the standpoint of marketing activities, the nonwoven industry has had some distinct advantages over the traditional textile industry. In the earlier days of nonwoven product marketing, advantage was taken of the possibility of offering a lighter weight and lower cost nonwoven product to substitute for a heavier weight woven fabric (Smith, 1994). The nonwoven market is almost equally divided between disposable nonwovens which have 55% of market share, and durable nonwoven for remaining (Moreau, 1990). The growth of market will be led by disposable products, which should surpass durable types in both cost and weight. This can be explained in term of a continued demand for convenience products unhindered by any restricting environmental regulations.

In nonwoven industry, the leading fiber used in the disposal market is polypropylene, and the other major fibers are polyester and rayon. The popularity of synthetic fiber in the nonwoven manufacture is attributed to low cost, uniformity, ease of processing, and a wide range of properties that included deniers, lengths and degree of crimp (Moreau, 1990). However, in the wake of heightened environmental awareness, natural fibers are again being used increasingly for technical end-uses. Schmalz and Böttcher (1994) reported that there was growing interest in the use of natural fibers for the following reasons :

- a) environmentally-friendly manufacture and disposal,
- b) significant raw materials resources in many countries of Asia, Africa and Latin America,
- c) advantageous properties, especially relating to moisture absorption and moisture transmission.

Among the natural fibers, silk has retained its fascination with its special charm right up to the present day. Silk is always the leading fabric in fashion collections and it is still the material most desired for apparel and home furnishings. Its optical impression, handle and the classic draping of the fabric together with its physical and physiological properties make silk the highly prized material. Silk cultivation and processing are manually taken a long time and considerable experience together with enormous patience. For this reason, silk seems to be a valuable material itself. However, about two-third of the cocoon filament is not highest quality. This part, as well as waste from reeling, twisting and weaving, can be further processed to spun silk and coarse noil yarns, even though it is difficult to spin. But some loose silk mesh around the cocoon which have been removed at the beginning of reeling can not be used for spun yarns or noil yarns because of less quality and too fine fibers. As a matter of fact, this part of waste silk has never been utilized for ages. For these reasons it was got an idea to make this worthless waste silk to a disposable nonwoven. Compared to other natural fibers, silk has advantageous physical properties such as strength and durability in shear, light weight, soft and luxurious hand, and high level of moisture absorption for comfort wear. Moreover in keeping with the growing awareness of environmental matters, silk is naturally biodegradable.

The objective of this thesis was, firstly, to study the possibility in producing a nonwoven fabric from waste silk by conventional carding process and followed by thermalbonding technique for bonding, and, secondly, to study physical and mechanical properties of the products to verify whether they are acceptable for textile applications. Waste silk from the mesh around the cocoons, so called Keba, was blended with bicomponent fibers, i.e., polyolefin or polyester which compositions were varied in contents between 20-35% by weight. The roller carding machine was used for forming the blended webs. The webs, then, were passed through the belt-calendered thermalbonding machine for heat compression. This technique was selected because of its greater ease of process, low energy consumption, and improved fabric properties (Gibson and McGill, 1987). Some fabric properties such as tensile strength and tearing strength were evaluated and, compared with some products collected from the market. Apart from its biodegradability, the nonwoven product from waste silk should have a luxurious appearance, soft hand and moderate durability which can be useful for disposable products. It may be effectively used as underwears, tableclothes, and wall hangings of high value addition. Furthermore, the waste silk problem will be solved for silk industries. In any case, this study may be guideline for product developement with innovative approach to pave the way to alternative uses.