明新科技大學92學年度研究所 □一般生 □在職生 招生入學考試命題紙（9-1）

科　　目	考試日期	節　次	准考證號碼
案例分析與論文討論	92年5月11日	第 1 節	

題目一（案例分析）：（50分）

國內目前正積極推動產業電子化（e-Business）以提昇產業之競爭力。在產業電子化的過程中，許多企業或個人皆可利用網際網路及各項通訊管道，蒐集、分享、及交換資訊，並進而利用所蒐集到的各項資料，藉由資料採礦（Data mining）方法，加以分析整理，以具體提供內部人員管理、及生產採購決策，更積極提供消費者資訊與服務，提高企業之競爭優勢。目前許多商店皆已積極導入資訊化系統，並利用其系統進行銷售資料的蒐集、處理、整理、與分析，以提供動態商品管理政策。以下是針對某小型一百貨商場之營業報表，並依照其分類從中找出各部門之營業額，如下表所示，請針對下列問題具體說明您的想法：

1. 從這些數據中，您觀察到哪些現象？
2. 該營業所經理若想要利用這些數據進行分析，您覺得他可以從哪些方向考慮？
3. 你認為經理應該再蒐集哪些資料？
4. 你覺得經理該如何進行分析，請描述您的方法及步驟，並訂定其KPI（主要關鍵指標）。
5. 具體提出商品管理政策？請提出您的想法，並說明該如何進行之。

明新科技大學92學年度研究所 □一般生 □在職生 招生入學考試命題紙 (9-2)

科目	考試日期	節次	准考證號碼
案例分析與論文討論	92年5月11日	第1節	

日期	星期	圖書	玩具	珠寶	少淑女裝	文具	化妝品	女鞋	男鞋	嬰兒用品	男裝	睡衣
1	二	11,273	13,114	5,593	6,840	4,619	15,766	4,186	10,733	9,095	9,241	11,319
2	三	4,693	12,796	1,855	11,388	5,487	20,775	774	7,498	5,860	6,310	10,177
3	四	9,453	18,280	10,240	6,024	1,455	33,847	6,502	8,106	11,613	10,494	3,582
4	五	6,484	14,313	17,670	4,141	7,332	17,240	2,427	9,222	7,070	7,185	10,814
5	六	15,370	14,648	16,373	3,919	5,015	10,800	13,750	18,971	21,322	7,819	2,153
6	日	20,671	17,522	14,844	13,746	5,052	24,475	5,069	2,695	14,805	11,546	20,882
7	一	4,053	12,719	13,285	5,759	1,537	18,110	3,855	1,783	4,396	7,745	6,845
8	二	3,200	17,381	12,066	12,326	3,969	20,934	5,664	3,987	5,713	10,322	8,628
9	三	10,149	16,100	15,949	3,814	773	30,895	8,283	1,762	12,450	13,793	3,337
10	四	5,120	11,978	11,435	3,665	7,521	25,336	4,584	9,956	11,356	13,509	11,329
11	五	5,944	19,096	11,975	9,591	5,883	28,371	9,721	4,500	4,719	11,685	11,191
12	六	13,672	20,555	16,556	3,823	7,425	24,659	8,046	4,298	6,219	6,344	9,863
13	日	21,660	21,344	8,614	5,493	10,773	28,830	5,265	17,780	6,099	14,653	21,166
14	一	7,991	13,669	10,620	12,622	9,697	26,659	2,498	8,675	4,792	4,152	5,539
15	二	3,496	1,701	10,008	12,924	4,975	17,190	10,279	5,367	3,919	4,099	7,630
16	三	11,177	12,453	8,723	12,576	861	19,764	4,693	7,046	10,634	9,207	2,743
17	四	3,522	17,475	10,313	11,895	5,671	21,166	4,873	9,248	5,463	8,949	2,691
18	五	2,574	19,557	12,263	6,516	1,078	23,733	7,269	2,182	2,607	12,097	7,978
19	六	3,330	20,037	8,714	11,669	9,108	25,404	10,171	3,838	9,384	9,822	10,740
20	日	9,976	19,761	11,515	12,816	2,820	20,378	7,370	4,178	22,270	7,582	11,394
21	一	9,666	1,671	12,541	9,439	4,321	30,086	8,541	5,528	3,862	11,342	6,958
22	二	1,654	11,903	5,188	6,064	5,767	32,765	7,255	3,905	11,485	12,235	11,328
23	三	8,350	13,731	13,985	11,896	5,772	25,242	3,659	9,715	12,051	8,858	7,018
24	四	6,177	13,556	11,389	4,114	8,334	20,573	6,159	11,497	5,670	4,381	8,226
25	五	6,134	2,578	17,717	11,374	4,018	15,015	1,971	7,521	9,991	5,736	3,803
26	六	22,252	24,146	19,846	5,266	9,138	25,433	10,588	8,397	11,406	16,604	8,221
27	日	20,215	21,324	10,249	8,542	3,288	24,040	11,437	4,729	11,677	5,028	5,280
28	一	4,393	13,350	10,880	4,522	7,163	22,161	1,563	10,435	10,637	5,285	4,634
29	二	1,940	13,212	11,408	4,769	5,344	31,793	771	2,429	7,641	12,627	10,006
30	三	6,398	11,981	15,219	5,721	4,676	31,125	3,213	2,045	6,945	11,516	9,081
31	四	9,110	19,898	14,222	7,319	4,826	21,523	3,266	4,707	11,509	12,299	5,797
總計		270,097	461,849	371,255	250,573	163,698	734,088	183,702	212,733	282,660	292,465	260,353

明新科技大學 92 學年度研究所 □一般生 □在職生 招生入學考試命題紙 (9-3)

科　目	考試日期	節　次	准考證號碼
案例分析與論文討論	92 年 5 月 11 日	第 1 節	

題目二(論文討論)：　(50分)

請閱讀下面這篇文章，並回答相關問題。(除專有名詞外，請以中文作答)

1. 請說明本文主旨(50 字以內)。
2. 請列出三個關鍵詞並簡單說明之。
3. 作者在文內對這個產業相關人員的哪一項知識的缺乏感到驚訝?
4. 這個產業使用最普遍的生管技術是哪些，請列出三項並說明之。
5. 50 字以內說明此篇的結果。

PRODUCTION AND INVENTORY MANAGEMENT IN TAIWAN: THE CASE OF AUTO BODY PARTS MANUFACTURERS

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This article provides some insight into the production and inventory management methods used by aftermarket auto body parts manufacturers in Taiwan, Republic of China. The information about these manufacturers was gathered during a two-week period of observation by the authors. The Taiwan Auto Body Parts Association invited the authors to tour a number of its members' facilities. From January 24 to February 6, 1999, a total of 11 facilities located at various points throughout the island were visited. The facilities had different product mixes and were in various stages of technical development. According to Hung and Whittington [7], new understandings of East Asian economies have stressed contrasts with Western models of business organization. In light of that observation, a review of production and inventory management techniques used in this area should prove interesting, informative, and instructional to both practitioners and academicians.

We will begin by briefly discussing Taiwan and Taiwanese manufacturing. The introduction of aftermarket parts and their certification process will follow. Finally, we will discuss the state of Taiwanese aftermarket auto body parts manufacturing from a production and inventory management perspective.

TAIWAN

Since the 1960s Taiwan has adopted an export-orientation policy to accelerate economic development [13]. As a result the nation is very industrialized with an unemployment rate of only about 3%. Taiwan, as a whole, enjoyed spectacular economic growth during the 1980s through the mid-1990s [7]. In fact, Taiwan is one of the few countries in Asia not affected by the financial turmoil, allowing its companies to continue investing abroad [10]. Taiwan's foreign exchange reserves at the end of 1997 were $83.5 billion, with public external debt amounting to a little more than $100 million [10]. During Taiwan's process of economic development, there has been no excessive reliance on foreign capital; private savings are the main source of funds for local investment [10].

Like other East Asian countries, Taiwan has not been traditionally regarded as a source of manufacturing innovation. However, during the past decade, Taiwan has focused increasing attention on developing high-tech, value-added industrial development policies so that technology is upgraded and research into new technologies conducted [8].

MANUFACTURING IN TAIWAN

Although most of Taiwan's manufacturing enterprises are small or medium-sized, the following information is most likely applicable to all Taiwanese manufacturers [10].

Education

In accordance with the Confucian tradition, higher education is deeply respected [7]. Taiwan is distinct, though, from other Chinese cultures in the especially high value given to engineering training [7]. As a result, the Taiwanese education system is strongly oriented toward engineering. The proportion of engineering graduates rose sharply from the 1950s to the 1980s, and many of the best students have taken higher degrees in the United States [7]. Much of the educational process is geared toward the needs of manufacturing.

Manufacturing Strategy

Most Taiwanese companies are original equipment manufacturers (OEMs) [13], as opposed to aftermarket manufacturers (those who copy their product from others using a "reverse engineering" process). Hung and Whittington [7] explain that Taiwanese firms, unwilling

or unable to invest long-term, "typically concentrate on the low-cost manufacture of OEM products for export markets, rather than building their own R&D resource, brands, and distributions." However, they note that there is still a strong propensity for reverse-engineering of Western or Japanese products [7], as we shall see.

Manufacturing Labor

During the boom years of the 1980s indigenous labor was in short supply, making access to high-quality assembly workers a critical resource [7]. With the current low employment rate, satisfactory manufacturing labor continues to be difficult to find. To meet the need for workers, a number of the firms the authors visited have brought in laborers from Thailand and the Philippines. These workers are housed in dormitory-like facilities and paid a wage close to that paid the native workforce. However, one executive indicated that his firm would never let one of them check the quality of parts.

Despite the presence of relatively weak labor unions [10], Taiwanese manufacturing firms have traditionally made annual bonus payments to employees near the time of the Lunar New Year holiday [7]. According to Morton [11], these bonuses allowed Taiwanese manufacturers to employ "more workers, more stably."

A final note of interest, the authors observed that no workers left the plants during lunch. All workers ate box lunches either catered or prepared in a kitchen in the plant. One firm, located in a rural area, has its own kitchen where it prepares free box lunches for employees. This firm also generously provides a free meal for employees before they leave the plant to go home.

After dining, the workers take a nap for the remainder of the lunch hour. In the offices lights are turned off while employees fold their arms and place their heads on their desks. In the plants employees pull out large sheets of cardboard on which to lie while they sleep. The authors do not understand why this practice has not "caught on" in the United States.

AFTERMARKET PARTS

OEM auto body parts are parts made by the original automaker or manufactured by a firm under contract to the original automaker. Aftermarket auto body parts are parts that are not made by the original automaker nor is their manufacture contracted by the automaker. Essentially, aftermarket parts are copied from purchased OEM parts. The dimensions of the OEM part are determined through a process known as "reverse engineering." Usually, reverse engineering is a common and relatively straightforward process [12] (though some have called it an art form [18]) used when a company wants to know more about a competitor's design (or for computer-aided inspection) [12]. In this case, the aftermarket manufacturer needs to know everything about the part necessary to manufacture it. The dimensions of the OEM part can be determined through measurement on a coordinate measuring machine or use of a CAD/CAM (computer-aided design/computer-aided manufacturing) system. Dies, which are then built according to these dimensions, are used to manufacture the aftermarket part. Several of the Taiwanese manufacturers visited had facilities to produce their own dies. Other firms had to contract for the production of their aftermarket dies (some contracted them from competing Taiwanese firms).

The first wave of non-OEM automotive crash parts (fenders, hoods, quarter panels, bumpers, and bumper covers) appeared in the U.S. marketplace in the late 1970s, but non-OEM mechanical automotive parts (batteries, spark plugs, engine parts, shock absorbers, and brakes) had been widely accepted and used for decades before that time.

Initial demand for generic automotive crash parts was great. That demand together with favorable manufacturing capabilities and the cost of labor helped the business grow into a profitable one for Taiwanese manufacturers. Within a few years non-OEM crash repair parts had captured approximately 10% of the market. Although at that time inconsistent part quality made it more time consuming for body shop technicians to repair a car, the low cost of the part made it possible for auto body repair centers to make a hefty profit. Insurance companies' discovery of the use of aftermarket parts coincided with their efforts to cap insurance costs; hence, they changed their policies to reflect their desire to benefit from these lower-cost parts.

Changes in insurance company policy caused an increase in the sale of aftermarket parts (see authors' endnote) so that their market share grew to approximately 15%. Body shops not using aftermarket parts protested. In response, distributors of generic automotive crash repair parts decided to initiate an independent third-party certification program modeled after Underwriters' Laboratories. The purpose of certification was to ensure quality and consistency in aftermarket parts. This program, established in early 1986, was named after the distributors' trade association and was called the Auto Body Parts Association (ABPA) Certification Program.

Because of a lack of funds and little cooperation from the aftermarket parts manufacturers, ABPA was unable to sustain the certification program. A number of insurance companies, however, expressed an interest in certification, and in December 1987 the Certified Automotive Parts Association (CAPA) was incorporated.

TABLE 1: Production and Inventory Management Techniques

Firm	ISO9000	QS9000	ISO14K	CAPA	SPC	MRP	JIT	Robotics	Bar Code	CNC	Kaizen	FMS
1	Yes	Yes	No*	Yes	Yes	Yes	No	Yes	No	Yes	Yes	No
2	1996	No*	No	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes
3	No	No	No	No	No	—	—	Yes	—	—	—	—
4	1998	1999	No	Yes	No	—	—	—	—	—	—	—
5	Yes	No*	—	Yes	Yes	No	—	Yes	—	—	—	—
6	1995	1997	No	Yes	Yes	Yes	Yes**	Yes	No	Yes	Yes	No
7	Yes	Yes	—	Yes	Yes	—	Yes**	Yes	—	—	Yes	—
8	1997	1998	No	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes
9	1993	1998	No	No***	No	Yes	Yes**	Yes	Yes	Yes	Yes	Yes
10	1995	1997	No	No	No	Yes	No	Yes	Yes	Yes	Yes	No
11	1996	1998	No*	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes

—Incomplete data. *certification applied for. **JIT used only in manufacture of OEM parts. ***parts manufactured not among those certified by CAPA.

CAPA

CAPA was established to oversee a testing and inspection program for certifying the quality of parts used for auto body repairs. CAPA describes itself as a "nonprofit standard setting organization whose purpose is to ensure the quality of automobile crash repair parts" [1]. Policies are set by a nine-member board of directors representing auto body shops, consumer groups, insurance companies, and parts distributors. Parts that meet or exceed CAPA requirements are allowed to display the CAPA Quality Seal, and the parts are listed in a directory made available to the auto parts industry.

To achieve and maintain certification, participating aftermarket manufacturers must adhere to the standards contained in the quality standards manual [1] and subject themselves to periodic audits. The quality standards dictate the reverse engineering process that must be followed.

To select a master—the part from which dimensions are used to develop the die—the manufacturer must carefully compare the dimensions of five purchased OEM parts. Ten measurements must be taken. The part with the largest percentage of points closest to the average of all five OEM parts will be chosen by the manufacturer as the OEM master part. CAPA has also proposed that the manufacturer be required to test-fit the five OEM parts on a vehicle to determine which of those five parts best fits the vehicle [19].

TABPA

The Taiwan Auto Body Parts Association (TABPA) is a loose-knit group of approximately 30 companies manufacturing sheet metal and plastic aftermarket automotive crash parts. Typically, these include fenders, hoods, quarter panels, header panels, lighting assemblies, and bumpers. Member companies vary in size, revenue, and product quality level. A number of the firms produce OEM parts as well as aftermarket parts. Annual aftermarket crash part sales in the United States are estimated at $1.5 billion. Despite the size of the market, the association has little formal structure.

PRODUCTION AND INVENTORY MANAGEMENT

A number of techniques, programs, and certifications are available to manufacturers to help them ensure quality products, made from quality materials, through quality processes. As in all cultures, in Taiwan not all manufacturers embrace every potential activity. We will review many of the available possibilities in the following sections. See table 1 for a list of the production and inventory management programs used by each of the factories we visited. Because of proprietary concerns, the manufacturers' anonymity is protected. The parts manufactured by each are listed in table 2.

ISO 9000

The ISO 9000 series was introduced to Taiwan by the Bureau of Commodity Inspection and Quarantine (BCIQ) in 1989 and adopted as the CNS 12860 series in March 1990 [13]. Governmental institutions—the National Bureau of Standards and BCIQ—and some nongovernmental organizations such as the Chinese Society for Quality Control, Chinese Productivity Center, Electronics Testing Center Taiwan (ETC) and Metal Industry Research Laboratories actively promote the adoption of the ISO 9000 series by Taiwanese corporations [13].

ISO 9000 has been found to help Taiwanese plants significantly [13], which is probably partially responsible for the high incidence of certification shown in table 1. Shih et al. [13] surveyed Taiwanese manufac-

TABLE 2: Taiwanese Factories and the Parts Manufactured at Each

Firm	*Parts Manufactured*
1	Sheet metal parts—hoods, fenders, doors, radiator supports
2	Sheet metal parts—hoods, fenders, doors, radiator supports
3	Plastic header panels
4	Reinforcement bars, bumpers, radiator supports, aprons, nose panels, fenders, hoods, fuel tanks, doors
5	Sheet metal parts—hoods, fenders, doors, radiator supports
6	Sheet metal parts—hoods, fenders, radiator supports, bumpers, tailgates
7	Sheet metal parts—for cars: bonnet assemblies, front floor panels, trunk lid assemblies, fuel tank assemblies, member assembly RR side, door assemblies and front fenders; for trucks: roof panels, rear panels, B pillar outer panels, RR floor panels, fuel tank assemblies, front door assemblies, control & RR floor panels, and front floor panels.
8	Sheet metal parts—hoods, fenders, bumpers, doors, apron supports, rebars, fans, instrument panels, and light cases.
9	Plastic automotive lighting components and assemblies
10	Plastic bumpers, grilles, head lamps, door trim, instrument panels, spoilers, wheel covers, air ducts, fenders, and hoods.
11	Sheet metal parts—hoods, doors, fenders, bumpers, nose panels, radiator supports, grilles, side panels, windshield frames, fuel tanks, radiators.

turers and found six factors or benefits associated with implementing IS0 9000:

1. Employee productivity is enhanced.
2. Systemization is well documented with data.
3. Quality control is improved.
4. Ability to compete in sales is increased.
5. Internal auditing system is verified.
6. Managerial responsibilities are clear.

Huang and Tan [6] found the following additional benefits for Taiwanese manufacturers (they are listed in order of importance as perceived by survey respondents):

1. Greater quality awareness.
2. Higher managerial standards.
3. Discovery of flaws in the quality assurance system.
4. Discovery of managerial flaws.
5. Internal adjustment.
6. Promotion of staff.
7. Better export sales.
8. Decreasing defect rate.

It is interesting to note that decreased defect rate was found at the end of the list.

Almost all the Taiwanese manufacturers shown in table 1 have implemented ISO 9000. For most of them the impetus has been that many European firms do business only with companies that are certified.

QS 9000

QS 9000 was released in 1994 as an interpretation and extension of ISO 9000 for automotive suppliers [8]. A collaborative effort by Ford, General Motors, and Chrysler, it includes all ISO requirements as well as certain automotive sector requirements [7]. It actually goes well beyond ISO 9000 standards in its focus on the customer and continuous improvement [7].

With one exception, for the manufacturers in table 1, QS 9000 certification followed ISO certification within two years, possibly because of the overlap in requirements. To be QS 9000 certified, a company must first fulfill the requirements of ISO 9000. However, there could be other reasons for the high rate of certification. Obviously, those firms that also manufacture OEM parts must be QS 9000 certified, and competition can be enhanced by the certification.

ISO 14000

ISO 14000 is the "environmental" version of ISO 9000. It is actually a set of voluntary standards whose aim is to give companies direction for managing, measuring, improving, and communicating the environmental aspects of their operations [10].

It could be surmised from table 1 that IS0 14000 has yet to capture the attention of most manufacturers. Not one has attained ISO 14000 certification; only two have applied. However, pollution is a problem in Taiwan and a concern to its citizens. That concern, coupled with the fact that most firms were motivated to attain ISO 9000 and QS 9000 certifications, and that ISO 14000 has not been present as long as the others, could indicate that ISO 14000 will become more desirable in the future. One firm said it had begun the certification process, but abandoned it until a later date.

CAPA

Although some of the 30 TABPA members make parts that CAPA does not certify (18 have been approved for the manufacture of certified parts), all but three firms visited indicated that they manufacture at least some CAPA-certified parts. Only one of the three firms in table 1 without CAPA certification manufactures parts that CAPA does not certify. Although the overall percentage of CAPA-certified parts is very small, table 1 indicates that most firms visited make the effort to certify at least some parts.

Statistical Process Control

The use of statistical process control (SPC) was widespread in the factories visited. Several of the manufacturers that do not use SPC manufacture only plastic injection molded parts. CAPA certification requires the use of SPC in the manufacture of sheet metal parts and mandates certain process capability requirements.

Material Requirements Planning/Manufacturing Resources Planning

Material requirements planning/manufacturing resources planning (MRP) use was fairly consistent across the firms visited. When they were asked about it, the plant staffs knew the term MRP and responded immediately.

Just-in-Time

The lack of Just-in-Time (JIT) use was surprising to the authors. Only two firms indicated its use and both used JIT for OEM parts, not aftermarket parts. Because OEM parts are used in automobile manufacture, not just crash repair, the demand for them is predominantly dependent and much easier to forecast than independent-demand aftermarket parts. However, the fact that JIT was not used at all and that there appeared to be no interest in its use is puzzling. Some of the manufacturers appeared to have a considerable inventory of aftermarket parts; one firm indicated its intention was to increase inventory levels!

Robotics

Today's manufacturers are rapidly increasing productivity by taking advantage of automation technologies. With the combination of technology development policies and the emphasis on engineering education, Taiwanese manufacturers should not be an exception. The use of robotics varied with the individual firms but all used robotics to some extent. One of the most interesting firms used a jet spray of water to cut header panels.

Bar Code

Another puzzling fact was the scarcity of bar coding use. Given the relatively low expense and vast potential benefits of bar coding, the authors were amazed at how few firms took advantage of the technology.

Computer Numerical Control

Computer numerical control (CNC) is a technique in which a machine tool controller uses a computer or microprocessor to store and execute numerical instructions [3]. Use of CNC should be extensive because CNC is closely associated with the use of robotics. Table 1 shows that all 11 firms probably use the technique.

Kaizen

Modern manufacturing firms have learned the value of continuous improvement through formal kaizen programs, quality circles, or small group involvement. Each firm with a "yes" under kaizen uses some sort of formal small group improvement process. Automotive manufacturers tend to be "stereotypical" examples of users of such activities; most manufacturers visited indicated formal improvement processes.

Flexible Manufacturing System

A flexible manufacturing system (FMS) is an automated production system that produces one or more families of parts in a flexible manner, somewhat like an automated job shop or a miniature automated factory. Because traditionally, aftermarket parts compete on a basis of cost rather than flexibility, few FMSs might be expected within the factory walls. Four of the factories visited used one or more FMSs in their parts manufacture.

Theory of Constraints

A glance at table 1 reveals there is no column for theory of constraints (TOC) use. It was not included because none of the 11 manufacturing facilities used TOC. Surprisingly, almost none of the factory administrations had even heard of TOC, Dr. Goldratt, or *The Goal* [5]. One engineer told the authors that he had heard the term "theory of constraints" but did not know what it meant. One author asked the plant manager in an extremely rural plant, if he had read *The Goal*. The author was pleasantly surprised when the plant manager pulled a Chinese translation of the book from his shelf and explained that the president of his company had helped translate the book into Chinese. However, it is doubtful that the manager understood the implications of the book because he said he felt it was a "criticism of the Toyota system." It should be noted that executives at several of the factories expressed considerable interest when the concept was briefly explained.

CONCLUSION

Most of the techniques available to modern manufacturers are being used by the auto body part manufacturers in Taiwan. Although credit should be given to the Taiwanese manufacturers for their motivation and successful implementation of these techniques,

much of the motivation is the desire to be competitive with OEM manufacturers and increase their ability to be players in the global marketplace. The most obvious absences are use of JIT and adoption of TOC concepts.

Conclusions were drawn from visits made to 11 auto body part factories in Taiwan, a small sample of the 30 firms represented in TABPA. Their generalizability, therefore, may be limited. Hung and Whittington [7] found that as groups of firms (in Taiwan) compete or cooperate within their sectors, they evolve into "communities" with shared outlooks and ways of operating. These groups would be expected to cluster particularly closely around the dominant pattern of their local society and to be characterized by a "dominant logic" [7]. However, Hung and Whittington [7] reported being struck more by diversity than conformity. Hence, care must be taken in assuming that this information is the norm for all Taiwanese manufacturers. Despite the widespread use of quality assurance and improvement techniques and modern production technology, Taiwanese aftermarket auto body parts have been severely criticized as unsatisfactory [2] (*see authors' endnote). However, that issue is beyond the scope of this article. The fact remains that these Taiwanese manufacturers have "kept pace" with much of the rest of the world in their use of production and inventory management techniques.

ENDNOTE

On October 4, 1999, an Illinois jury awarded $456 million to policyholders of State Farm insurance in a class action suit for the company's practice of encouraging the use of non-original equipment auto body parts [15]. A few days later, the judge ruled that State Farm had committed fraud in connection with its use of imitation crash parts for car repairs, and awarded $730 million in extra damages [8]. A spokesman for State Farm said, "The fact is, we receive few complaints about these parts from customers...and we've saved our policyholders almost $234 million in 1997 alone by specifying them" [16]. The same week, State Farm said that it would temporarily suspend the use of aftermarket crash parts [16]. State Farm plans to appeal [8, 14]. A spokesman for TABPA said, "We are developing both long and short term strategies to overcome the recent blows to our industry and assure a healthy U.S. market in the future" [17].

On November 2, 1999, a lawsuit was filed accusing State Farm and six other insurers of creating CAPA to conceal flaws with aftermarket crash parts [9]. CAPA was not named in the lawsuit. A spokesman for the Insurance Information Institute (the nonprofit communications arm of the insurance industry) called the accusations "absolutely preposterous" [9].

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