Case Study Name: Strategic Sourcing and Pricing Decision in the Semiconductor Supply Chain

Case Study By: Aashish Paudel

***The case problem that I analyzed and addressed in this study is in page number 7.*

1. **Major Facts:**

- Universal Motor Company is regarded as one of the largest motor companies found that its traditional suppliers won't be able to fulfill the demand for the semiconductors important to the new 1980s government mandated emissions standards.
- The new demands boosted the need for advanced electronics quickly where the auto makers were only reporting around 2% of annual spending on advanced semiconductors.
- The established supply management organization was experienced but were not prepared to strategically plan in a rapid changing technological environment.
- Running out of stocks and supplier indifference led to huge production disruptions and thus lack of semiconductors was the major cause of stoppages, as suppliers prioritized bigger markets.
- The projected spending for the chip was expected to grow exponentially exceeding $90 million by 1985 for the overall auto industry.
- Building in-house chip operations required at least $50 million upfront for Universal.
- The semiconductor supplier base was only saying that it would replace the rare defective part which was very much conflicting with Universal's motivations of good quality, supply continuity and technology leadership.
- Custom packaging and rigorous testing were only important for the auto sector but not to any other standard clients of the chipmakers.

2. **Major Problems:**

- The procurement strategy which Universal currently practiced led to frequent production stoppages because their suppliers gave low priority to the automobile clients which was not aligning with the quality and supply standards.
- The approach limited Universal's power to get prioritized, proper custom packaging with higher quality because of the existing approach of having multi supplier sourcing which created weak relationships and increased complexity.
- Universal needs to make a strategic decision to decide whether to invest heavily for in-house manufacturing of chips or try to improve its supply chain relation.

3. **Possible Solutions:**

A. Make Semiconductors in house:

The Company could spend a lot of money to build its own factory to make the semi-conductor chips needed for its cars. When the company makes its own chips. It can take control over all the steps making sure that everything is of the highest quality, and they can have a tech secret. But this is super expensive, and there were very few engineers at the time to build these. It's also risky to start something new that the company has never done before.

B. Work Closely with a Few Chips Suppliers:

Instead of buying chips from many different companies, Universal could team up with just a couple of the best chip makers where they can start developing a strong bond with these chip makers, where the company can promise investing heavily to buy a lot of chips from them if the

supplier agrees with all the conditions that Universal has. Universal can save a lot of money this way instead of building a new factory and would get better quality chips than before where because of the bond and being a priority, they can set special requirements for them with the supplier. Universal needs to keep on being in touch with them if any problem arises and be good on their end of the promise as well.

4. **Possible Solutions:**

Advantage A:

- Universal will have everything under control and make sure that the chips are perfect for their cars.
- Other companies won't be able to copy their chips which helps them keep their secrets.

Disadvantage A:

- Building a chip factory would require a lot of money which would require a lot of thought before execution.
- They might not find enough engineers to develop the chips as the case says that there very few skilled people for this job.
- Making chips is very hard which the above two points show and Universal can risk wasting a huge amount of money and time for this kind of ambitious project.

Advantage A:

- Universal can get chips without spending a truck load of money on their own factory development.

- They can take advantage of the skills and experience of already low amount of manpower and experts in already standing chip companies.
- The chip companies could help Universal make better or newer chips if they invest a good amount of money.

Disadvantage B:

- Universal won't have the full control and must rely on the chip maker company
- If the chip makers get busy with other customers, Universal might have to wait or even get a lower quality when the chip maker is very busy.
- They need to trust these partners and keep them happy all the times to get what they want.

5. **Choice and Rationale:**

   Universal should work with chip suppliers and create close partnerships. This path is most consistent with Nagle & Hogan's value-based pricing and supply management tactics.

- This is safer and costs less than developing their own chips.
- Universal can learn from the already established chip companies who are already much more advanced and know how to make great chips faster.
- Universal can make special requests by making good deals with the suppliers and make sure the chips they get pass all the criteria listed by them.

So, here trying to build and run their own factory would be very risky as well as it's super expensive for them where they have no experience of what they are building, and the manpower

required to build quality chips is also very scarce. Thus, my choice would be to go with the solution of getting the chips from a chip maker.

6. **Recommendations / Implementation:**

Universal should team up with a few very good companies who manufacture the best quality chips in the market where the company needs to think of it like picking good teammate for their team. The main point that they need to follow is, they should always create a promise in the contract where they will be fulfilling certain things and the chip maker should also make sure that they will fulfill their part of the promises. There should also be good communication between the company and the chip maker. They should always be open to look for other chip maker companies just in case their current choice is inferior to some other company who can provide newer technology or higher quality.

References

Nagle, T. T., & Hogan, J. The Strategy and Tactics of Pricing: A Guide to Growing More Profitably (7th Edition).

Doyle, M. F., & Burt, D. N. (Year). The Universal Motor Company Acquires Semiconductors (Case Study).

THE UNIVERSAL MOTOR COMPANY ACQUIRES SEMICONDUCTORS

Background

The Universal Motor Company is one of the world's largest manufacturers of automobiles and trucks. In 1980, purchase content was 65 percent of the cost of goods sold. The supply management organization was well managed and staffed with seasoned, well-educated professionals (for the time period).

During the late 1970s, the U.S. government began addressing the air pollution issue by establishing vehicle emissions standards and corporate average fuel consumption targets for vehicles sold in the United States. The auto industry was faced with major technical problems. The U.S. government-mandated standards could not be achieved with available technology. These mandated standards required the auto industry to design engine control computers (fuel intake, spark timing, etc.) to manage engine efficiency more precisely.

Management was highly confident that established supply management policies and procedures that had been used successfully for so many years would apply to the procurement of the new semiconductors required for the manufacture of the new engine control computers. By 1980, it was obvious to the individuals directly involved that something was wrong. The tried and true methods of supplying stampings and plastic injection molded parts were not getting satisfactory results when applied to the procurement of semiconductors. The company purchased about $10 million worth of semiconductors in 1980 from twenty suppliers. Stockouts leading to production disruptions (absolutely forbidden in the auto industry) were occurring regularly. In fact, semiconductors were a greater cause of production disruptions than were all other purchased materials. Semiconductor suppliers, for the most part, seemed uninterested in the firm's problems and did not react to these emergencies in the way that more traditional auto industry suppliers react.

Those responsible for the procurement of semiconductors were under intense pressure from management to resolve these difficulties. But nothing they tried seemed to make a difference. During these dark days some important observations were made:

- The total 1980 worldwide auto industry semiconductor requirement represented less than 2 percent of the semiconductor market. Therefore, members of the semiconductor industry did not see the auto industry as an important market requiring or deserving any special service.

- The supply management practice of sourcing from many suppliers (to ensure competition and a low purchase price) was aggravating an already difficult supplier relations issue and further complicating the situation.

- Supply management projected its semiconductor requirements out over the next five years. The projection was shocking: The current $10 million annual requirement was forecast to grow to over $90 million by 1985. It seemed likely that this growth would be replicated by the entire auto industry. However, this growth did not increase the market position of the auto industry, as the semiconductor industry was growing faster than the automotive industry market component.

Based on these observations, it became clear that something had to change. The 1980 semiconductor supply situation was intolerable. Of equal or greater concern, projected growth in electronics requirements appeared to be unsupportable.

Forward Planning

In 1980, the concept of forward planning, business planning, or strategic planning was not commonly associated with the supply function. Supply management was most often thought of as a reactive function organized to support manufacturing. Marketing, on the other hand, was more often thought of as the proactive organization focused on the future of the firm. The failure of management to recognize the strategic and futuristic implementation of supply management limited innovative actions when dealing with a firm's supply world.

The 1980 situation demanded new thinking and a new approach to the acquisition of semiconductors. The supply managers involved had little choice, given the circumstances. Supply had no experience with strategic planning. There were no guidelines to follow. The responsible supply managers started with a clean piece of paper, a mission, and a problem statement.

The Environment

The first order of business was to develop a complete understanding of both the internal and external environments. The firm's engineers documented their future technology requirements in the form of a technology plan or road map. Once the internal requirements were understood and documented, the focus turned to the external environment, revealing an industry which was (and remains) dynamic, high growth, entrepreneurially focused, and technology driven—one that defies simple analysis.

Areas of Strategic Importance

Several major areas were identified as being of strategic importance to the firm's survival and future profitability: How can Universal ensure that it benefits from rapidly evolving technologies in the area? How can Universal obtain the desired/required quality? How can Universal best ensure a continuity of supply? What actions need to be taken to compress the time involved in going from concept to customer? Can manufacturing cycle time be compressed? How can Universal best minimize the "all-in-cost" associated with the acquisition and use of semiconductors?

The Make-or-Buy Issue

One of the major issues confronting the team had to do with whether the firm should make or buy the required semiconductor devices. (We will explore this issue in considerable detail since it is representative of the complexity of decisions in the areas of design, source selection, pricing, and related supply management issues. Further, the make-or-buy decision impacts on all six of the areas of strategic importance.)

In order to understand the make-or-buy question, management recognized the need for a complete environmental analysis of the semiconductor industry. A team of company experts including engineering, quality, supply, and manufacturing professionals was assigned to develop a program analyzing the semiconductor industry. Both primary and secondary researches were conducted. The research led Universal executives to conclude that the decision was more

complicated than simply deciding whether to acquire a semiconductor facility or buy the required components. It became apparent that the semiconductor make-or-buy issue consisted of many subissues. Accordingly, the entire process of designing, manufacturing, and testing semiconductors was broken down into stages.

The first stage (design) involved both human and computerized inputs. Computerized design was in its infancy. Carver Meade had recently written his book addressing cell-based design methodology. There was a CAD/CAM component to design. But most design was done without a lot of computer-aided blocks or cells by human design engineers.

The second phase consisted of the development of masks for the process. The third phase had to do with the actual manufacture of the semiconductor, including the manufacture of the silicon ingot and imprinting of the integrated circuits. The fourth phase involved testing the manufactured wafers. The fifth phase involved packaging the integrated circuits. The last phase had to do with testing the packaged circuits. Thus, detailed investigation revealed that there was a whole array of different manufacturing processes and engineering technologies involved and that the make-or-buy issue was not quite as simple as was originally thought.

1982 Environment Scan

A 1982 environment scan revealed some very interesting facts. The first and most important was that design engineers were in incredibly short supply. There were fewer semiconductor design engineers in the world than there were professional football players in the NFL.

A second finding was that there was adequate mask-making and manufacturing capacity for making ingots and imprinting integrated circuits. Manufacturing capacity (equipment and clean rooms) is incredibly expensive. To exacerbate the situation, technology moves very quickly and the obsolescence rate of the required capital equipment is quite high. For these reasons, senior executives properly were concerned about manufacturing capacity. But the research indicated that there was adequate capacity available worldwide and that sufficient capacity was being added to meet future demand.

The research effort revealed that the packaging issue consisted of at least two subissues: industry capacity and packaging technology. Capacity did not appear to be a problem. But management had some concerns about packaging technology to which the semiconductor industry was not sensitive. The semiconductor industry's attitude toward packaging was that parts would be placed into standard packages that would be good for all of the industry to use. The semiconductor industry's attitude was in conflict with Universal's ideas on manufacturing efficiency and module packaging, broad layout, size, weight, and other design requirements. Universal's ideas would allow the production of customized packages for special opportunities on new models.

Packaging

The issue of testing of the packaged semiconductor devices was extremely critical to Universal. The issue had to do with the relative value of a semiconductor to the various suppliers and to Universal. A semiconductor sold for $1 to $3, while an automobile, dependent on the semiconductor's performance, sold for $10,000 to $30,000 (1980 dollars). A $1 to $3 component could easily (and all too frequently did) cause a $20,000 automobile to malfunction, requiring the owner of the automobile to call a tow truck, pay for the tow truck, and have the vehicle towed in

for repairs costing several hundred dollars. This is not the basis of customer satisfaction or of increasing market share for the auto manufacturer. The importance of defect-free semiconductors was of far greater importance to Universal than to the semiconductor industry, whose liability was limited to replacing the defective part. Universal executives recognized that the semiconductor industry did not have the same motivation to quality as it had.

Technology Leadership

After the above analysis was completed, another issue influencing the make-or-buy issue came into focus: technology leadership. A chip might offer Universal technological leadership in the automobile industry and possibly some very important marketing advantages. Management became very nervous about its semiconductor supplier(s) being able to sell identical or similar chips to the firm's competitors. Universal wanted to own the technologies incorporated in these circuits. These technologies were viewed as strategic keys to Universal's future.

Management, with the assistance of legal council, determined that if Universal designed the chips in-house, for all practical purposes it would own the technology. The processing technology would be covered by contract license agreements.

Economics

The economics involved in the make-or-buy issue were unusually complex. In 1982, the manufacturing facilities that were required to make a meaningful volume of semiconductors for Universal would have cost in excess of $50 million. There was concern about Universal's ability to run a high-tech semiconductor facility effectively and efficiently. Further, there was the issue of culture. Would the auto industry culture and the semiconductor industry culture mesh? It became apparent that a decision to manufacture integrated circuits (ICs) was a very high cost strategy. It was likely that the resulting ICs (manufactured by Universal) would cost two to four times as much as purchased ones. However, management felt that the cost penalty might be a sound investment in quality and technology and give Universal a significant competitive advantage.