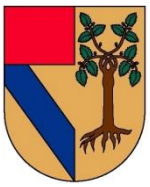

UNIVERSIDAD PANAMERICANA

CAMPUS AGUASCALIENTES

School of Economic and Business Sciences

Graduation Case Study

"Make vs. Buy

HAVAP de México, S.A. de C.V."

Masters in Project Evaluation and Management

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Aguascalientes, Aguascalientes, Thursday November 14th, 2013

DEDICATION

This case study is dedicated to my professional mentor Eric, my leadership role model; a true Level 5 leader, who has always shown a cold mind and a warm heart.

My master's degree was a personal goal from the minute I graduated from my bachelor's degree, but I made decisions and postponed this plan.

I will never forget the day of my performance assessment when you Eric, offered me a scholarship to pursue my master's degree and continue growing professionally.

I promised you that my final case study would be something made especially for you, something that would not be based on any past case but a creation of my own where I could try to offer you my best insight to the difficult world of Supply Chain Management and production location versus buy decisions.

This case study is also dedicated to my personal mentor Ben, my role model as a human being and a great professional coach. The best brother you could ever wish for, who was always taken the role of a father to me.

I will always remember how you quit studying for a few years to pay for my studies, and how I started working so we could graduate pretty much at the same time from college.

You completed your master's degree much sooner than I. You continue to read and learn almost every day. Not only do I love you but I admire you.

This case study is dedicated as well to my biggest love in life, my son Alan. I know I sacrificed so many Friday afternoons and Saturday mornings with you during 26 months in order to complete my post-graduate studies and be in a better position to offer you a brighter future.

I have learned that God has a plan for each of us, and I promise I will do my best to support you and accompany you to achieve your personal goals, in your music, professional or any career you pursue. I want to help you find what you're passionate about and make a living from it.

Every single academic achievement of mine, I have offered it to my mother. There's nothing comparable to her smile of satisfaction. I used to win awards and diplomas just to enjoy that look.

Mom, you have always taught me to never ever give up and to be honest.

I still remember that almost every day you would ask me to never forget 2 special words: "Thanks" and "Sorry".

S.A.P.O, “thank you” so much for helping me find peace of mind. Thanks to this I was able to get back to work and complete the last 10% of my case study which was pending for 2 years.

I would like to “thank” my advisors: Alvaro Salinas, who reviewed my case several times to tailor it with his advice as a true Supply Chain Expert; and Jesús González, who helped me improve my case with all his project and financial wisdom, and who also encouraged me to finish my work.

I’m “thankful” to all of my teachers who shared with me and the class their knowledge and expertise, beyond the text books. I still laugh about the jokes in Financial Math with Luis Muñoz. Who could ever have thought that mathematics could be fun? I enjoyed economics a lot with Israel Macias, as well as operational finance and the business decision making seminar with Manuel Sainz, international finance with Enrique who is truly Ivy League. Of course structural finance and financial metrics with Jesús González were great.

I want to “thank” my class mates for sharing your knowledge and good times with me for over 2 years. I’m sure we are the best post-graduate class so far at Universidad Panamericana. Our group was so diverse, from a few recent Bachelor degree graduates, to company executives, from architects, farming business men, construction managers and financial directors, to an HR bachelor as myself. I learned as much from you all as I did from our teachers.

Finally, I’m “sorry” if I forgot to mention anyone in particular. There are so many people that have helped me out in life. I am so lucky to have so many friends and colleagues that wish me good or challenge me to be better.

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EXECUTIVE SUMMARY

The person that presents this following case study is a product manager for HAVAP (Home Appliances Value Added Parts), a manufacturer of small decorative plastic injected parts with several manufacturing sites in Asia, Europe and North America.

HAVAP seeks to contribute to making life more comfortable for its customers and consumers, while interacting in a friendly and sustainable manner with the environment and the community, as stated in the company's Basic Philosophy. As an action item to realize this philosophy, the company created an office in the headquarters in Dusseldorf to focus on designs that guarantee value added to all the stakeholders.

The company's factories in the recent years were downsized as a reaction to the market depression, not only by adjusting the variable costs according to the demand but also by reducing fixed costs to keep the required profit level.

In the beginning of this fiscal year the CEO set the mid-term strategy, which projects a potential market rebound. He has instructed the business unit leaders to optimize efficiencies and inventories to make capacity available and have cash flow ready to capitalize on increased sales volume when it comes.

HAVAP de México is competing in the last quarter of year 2013 in a bidding process from a German household appliance company for new model sourcing of a washing machine, which will be built in two of their worldwide assembly plants (Mexico and China) with a market launch of June 15th 2014. The part to be quoted is a knob for the wash cycle selection. The customer has a confirmed target price of US$1.025 per piece which should not be exceeded (and which should remain or be reduced through the life of the 5 year program) for the heater control unit for a projected yearly volume of 125,000 units. The product design is proposed by HAVAP de México working with the customer's design department.

The Querétaro, Mexico plant is corporation's newest and started with simpler injection parts before working on the more complex decorative parts like the knobs being quoted.

Its manufacturing representative said the capacity is almost full with models already awarded. It has suggested that pending on further capacity analysis there may be a need to produce this new model in another HAVAP's locations or to outsource the manufacturing to a supplier.

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COMPANY HISTORY

- In the year of 1946 Laundry Plastics GMBH was founded in the city of Dusseldorf, Germany.
- In 1963 Laundry Plastics GMBH issues an IPO (Initial Public Offer) in the DUS (Dusseldorf Stock Exchange) in Germany
- In 1975 Laundry Plastics GMBH opens a manufacturing site in America located in Long Beach, California, USA.
- Suministros de Línea Blanca, S.A. de C.V. started operations in Querétaro, Querétaro, México in 1980.
- During 1985 the operations of Laundry Plastics GMBH are expanded to Asia by opening a facility in Shenzhen, China.
- In the year of 2002 a joint venture is signed between Laundry Plastics GMBH and Suministros de Linea Blanca, S.A. de C.V., changing the company name to Home Appliances Value Added Parts (HAVAP); with the intention to expand business to Central and South America in the mid-term.

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HOUSEHOLD APPLIANCE INDUSTRY REPORT

http://www.hoovers.com/industry-facts.household-appliance-manufacturing.1168.html

EXCERPT FROM HOUSEHOLD APPLIANCE MANUFACTURING REPORT

Companies in this industry manufacture large appliances such as stoves, ovens, refrigerators, and washers and dryers, and small appliances including vacuum cleaners, fans, humidifiers, and dehumidifiers, and toaster ovens. Major companies include US-based GE and Whirlpool (owner of the Maytag brand, among others), and Electrolux AB (Sweden), BSH Bosch (Germany), LG Electronics (South Korea), and Haier (China).

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COMPETITIVE LANDSCAPE

Demand is driven by growth in consumer income and by home sales. The profitability of individual companies depends on efficient operations and effective marketing. Large companies have economies of scale in production, marketing, and distribution. Small companies can compete effectively by producing specialty products, subcontracting to the larger manufacturers, or producing name brand goods under contract. For example in the US this industry is highly concentrated: the top 20 companies generate about 90 percent of revenue.

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PRODUCTS, OPERATIONS & TECHNOLOGY

Major product categories are refrigerators and freezers (about 20 percent of industry revenue); washers and dryers (20 percent); and ovens and ranges (20 percent). Other products include dishwashers, fans, microwave ovens, vacuum cleaners, water heaters, and other small and large electrical appliances make up the rest.

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GLOBAL HOUSEHOLD APPLIANCE INDUSTRY 2012-2017: TREND, PROFIT AND FORECAST ANALYSIS

http://www.researchandmarkets.com/reports/2313024/global_household_appliance_industry_20122017

The global household appliance industry is expected to experience a CAGR (Compounded Annual Growth Rate) of 6.1% between 2012 and 2017 and the industry revenue is forecasted to reach an estimated $384 billion in 2017.

Favorable demographics, rising consumer incomes, and changing lifestyles are expected to drive the industry over the forecast period, which started from last year

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WASHER & DRYER MANUFACTURING:

MARKET RESEARCH REPORT

http://www.ibisworld.com/industry/washer-dryer-manufacturing.html

INDUSTRY ANALYSIS & INDUSTRY TRENDS

High unemployment and stagnant income growth from the recession resulted in consumers became less willing to purchase durable products like washers and dryers, which constrained industry demand. In response, larger firms shut down facilities, while smaller firms exited the industry. During the next five years, disposable income and housing starts are projected to grow strongly, fueling consumer demand for washers and dryers

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INDUSTRY REPORT - STARTING A NEW BUSINESS CHAPTER

The Washer and Dryer Manufacturing industry has high barriers to entry. The four largest players account for the vast majority of industry market share, reflecting high concentration that makes it very difficult for new entrants to succeed against well-established brand names. However, the largest barriers to entry for prospective operators are startup costs and product differentiation.

Prospective entrants to the Washer and Dryer Manufacturing industry face extensive startup costs for facilities, machinery and materials. Firms also need to develop relationships with distribution networks to place products in retail outlets. Because most washers and dryers are homogenous, there are a limited number of brands available for purchase.

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CASE BACKGROUND

This business case is to propose the best business decision in order to make the product available with the profit and quality expected by the company's top executives at the lowest risk possible.

The product development team is working with the Supply Chain Management organization and identified one supplier in Mexico who has some experience in building this type of product.

Part of the analysis is making a structured comparison between the manufacturing at a couple of the company's locations and an outsourcing option.

The sourcing committee's objective is to decide the optimum sourcing option for this project based on a build-location versus buy analysis, considering the following costs as COGS (Costs Of Goods Sold), or Manufacturing Costs:

- Cost of materials (Consider the Bill Of Materials provided by Cost Accounting or the Supply Chain Team);
- Conversion Cost (Direct labor, burden, manufacturing overhead, etc.);
- SG&A

Based on the build-location versus buy analysis and the overall case study, there are some questions that must be answered:

1. Identify the volume for breaking point to tilt decision from in-house to outsource.
2. If the volume over the program increases beyond the plan or drops well below the plan, what are the contingency plans? And, what investment would be needed for additional capacity if required?
3. What makes one supply chain better than other, regardless of the initial material cost?
4. What could be best, global production or localizing to the respective market?

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OPTIONS TO STUDY FOR SOLUTION

- Manufacture in-house at HAVAP de México in Queretaro State.
- Purchase from intercompany Laundry Plastics in China
- Outsource to external supplier Inyección Especializada in Mexico State

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THEORETIC FRAME:

COST BREAKDOWN

The first step to analyzing the different alternatives is to have the quotations from the different options in the same "Cost Breakdown" format in order to compare each of the line items of the cost breakdown. This will allow confirming that each option is based on the specified requirements (i.e. Volume considered and Raw Material Economics Price Date=Date for referencing prices of materials). It will also indicate which cost factors defer the most among the different sources. Some clarification or correction may be required to complete this comparison, aside from noting there might be differences coming from different foreign exchange rates used by the various sources.

Line items in this cost breakdown are:

- Material cost detail: Showing unit price and usage
- Purchased component detail: Showing unit price and usage
- Process Cost Detail: Showing cycle time and burden rates. Adding manufacturing overhead as a percentage of the manufacturing process cost
- Tooling costs: Showing amounts to be paid lump sum and not amortized in piece price
- SG&A: Showing ratio and amount per piece
- Profit: Showing ratio and amount included in piece price
- Logistics: Reflecting freight and customs cost per piece
- Packaging: Reflecting cost per piece
- Other surcharges.

Other vital information required for the Total delivery Cost and liability analysis are:

- Payment Terms: Decided by the supplier
- Shipping Frequency: Required by HAVAP
- Lead Time from order issuance to delivery receipt: Committed by the supplier
- Inventory Level: Calculated by HAVAP's Supply Chain Management dept.
- Warehouse space required: Calculated by HAVAP's Supply Chain Management dept.

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SOURCE COMPARISON

The second step to analyzing the different alternatives is to carefully fill out the "Source Comparison" sheet in order to take in consideration the details from the Cost Breakdown format to calculate the Net Present Value and add the liabilities and risks estimation for each of the sources being studied.

This Source Comparison shows the cost breakdown in a way which can be useful for benchmarking purposes (i.e. conversion cost per hour). It also shows the unit pricing benefits and the commercial liabilities implied in every option studied.

The traditional structure of the Source Comparison is as follows:

- Landed cost of raw materials and components: Adds unit cost + logistics to get the material and components to the manufacturing plant of each source studied
- Variable costs: Adding raw materials & components + Manufacturing Process Cost
- Conversion Cost: Adds Manufacturing Process and Manufacturing Overhead costs
- Sunk SG&A Variable Cost which would remain with each source studied (i.e. license fees per piece)
- Other SG&A
- Packaging
- Piece cost: The sum of above costs plus profit included.

On top of the traditional structure, this case study considers diving deeper into the following implications from each source, related to hidden costs which are normally not observed if the company is mainly tracking operating profit and not the line items below OP up to Net Income:

- Cost of Payment Terms: Showing the financial impact of the difference in payment terms Vs. the HAVAP's standard
- Financial Cost of Holding Inventory: Using a rate determined by Finance Dept.
- Storage costs: Related to inventory level calculated for each source studied.
- Outbound Logistics Cost: Logistics cost to get the goods from the manufacturing plant of the source studied to the delivery point requested by HAVAP.
- Total sourcing cost: The sum of the above which reflects traditional costs above OP plus the hidden costs below OP.

Since this analysis is trying to decide the best source, it makes sense to analyze the financial risks and not just the opportunities that each option represents and NPV-R for the proposed option.

So the following risks are being considered as reference for future sourcing proposals. Since there is no accurate way to guess the future, these methods are debatable.

Costs of poor quality management: Derived from the estimated yearly costs of the following:

- Rejects, which are calculated multiplying the average administrative and operational cost per each rejection event times the rejected Parts Per Million (PPM) that come from the table that correlates the QSES (HAVAP's quality assessment) score and the expected PPMs.
- Foreign Exchange Rate Risk Vs. peso quotation: Imagining that if the Fx Rate used for the quotation is lower than the average of the previous 5 years there could be the risk of a rebound to such level; or if current Fx rate at the time of the sourcing comparison is higher than the one used for the quotation there is the risk of the quotation being updated later to the current Foreign Exchange rate.
- Sunk SG&A fixed cost: Depreciation and Amortization remaining with each source studied, especially when purchasing instead of manufacturing leaves unavoidable depreciation and amortization with no revenue to be paid by.
- -Total Net Present Value: The sum of the net present value (using the discount rate defined by Finance Department depending on country of investment) for each option, including yearly cost reduction committed by each source plus the Sunk SG&A fixed cost.
- Net Present Value if the risks were adopted: Adding to the Net Present Value Of Poor Quality Management Costs and the Foreign Exchange Rate Risk.
- Inventory Tied Up: Value of inventory required according to safety stock and frequency of delivery.
- Liability: Value of open orders for filling the whole lead time pipeline.

One final comparison performed in this sheet is for the QDCDM (Quality, Delivery, Cost, Development, and Management –all in order of importance) assessment performed by a Cross-Functional Team from HAVAP to all sourced added to the Approved Vendor List. The proposal is to not just consider a minimum score of 3 for each of these categories, but to assign a weight to each depending on relevance for HAVAP in order to have an overall score that can distinguish a better source from a group studied.

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NET PRESENT VALUE RETURN

Net Present Value, also known as Present Discounted Value, is a future amount of cash flow generated (cash in from savings between best and second best option minus cash out from investment and related expenses) that has been discounted to reflect its current value, as if it existed today. The present value is always less than or equal to the future value because money has interest-earning potential, so the discount rate used is the rate at which HAVAP expects earnings in a specific country for an investment .

Net Present Value Return (NPV-R) is the factor that HAVAP institutionalized to approve investments.

NPV-R is calculated dividing Final Net Present Value of Future Cash Flow Generated, by Total Cash Out Amount.

For the Final Net Present Value HAVAP discounts not only the interest rate, but also the income taxes of the financial benefit generated by the investment.

The period of years of cash flow to be accumulated for the Net Present Value Return analysis is determined by the depreciation/amortization period of the investment studied.

The minimum NPV-R result expected by HAVAP to approve a standard project is 1.0, but the Company could decide to increase the acceptance criteria above 1.0 for higher risk investments related to new markets, new products, new customers or others.

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QUALITATIVE ANALYSIS

Besides the financial quantitative analysis; qualitative and strategic factors like time to market, intellectual property, technology transfer, alignment to sourcing mid-term strategy and others including supply chain risks must be assessed before proposing any source and managed after the sourcing decision has been made.

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SELECTION METHOD FOR SOURCING PROPOSAL

Finally, the Sourcing Proposal Sheet is submitted to the Sourcing Committee for decision making.

This sheet summarizes the results of the thorough analysis that the team made for each source studied to support their proposal.

This sheet also highlights the points that the Committee watches most carefully:

- QDCDM scores per individual category and weighted overall score per each source studied.
- Cost Factors: NPV-R for in-house, landed cost, total sourcing cost, vendor tooling cost, sunk cost, NPV, quality and foreign exchange rate risks, NPV with QA & FX risks, and obsolescence risk
- Qualitative Factors: Showing top 3 strengths and weaknesses per source studied
- Reason for selection: This may vary depending on requirements that must be complied regardless of overall cost-benefit relation.

The official reasons for selection accepted by the committee are:

- Development needs
- Quality first
- Ensure delivery
- Best NPV-R
- Other, which needs to be explained

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ANALYSIS

COST BREAKDOWN

As a reminder, the different alternatives for solution to be studied in this business case are

- Manufacture in-house at HAVAP de México in Queretaro State.
- Purchase from intercompany Laundry Plastics in China
- Outsource to external supplier Inyección Especializada in Mexico State

From the analysis performed to the three different cost estimations studied, after confirming that the different sources did quote the same specification, volume and raw material economic price dates; there are no fundamental nor significant differences that may make the accuracy of this comparison doubtful.

The result of this first comparison is that direct piece cost without sunk variable cost is more competitive from intercompany Laundry Plastics in China.

However, since this source is the furthest from point of use, it has longest lead time and therefore implies the highest inventory level.

Payment terms of the China source on the other hand are the most attractive.

Regarding the outsourcing option, this is not proving to be competitive in the first stage of the analysis.

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TABLE 1 - IN HOUSE COST BREAKDOWN

HAVAP DE MEXICO (QRO) ESTIMATION COST

Raw Material Economics Price Date: 01-mar-11 | Price w/ Contract Currency Fx rate to Peso: Dollar 12.5

Material Cost Detail

Material/Part Description	Base Unit Cost (KG or Per PC)	Grs Wght (KG) or Part Qty	Material Size L	W	T	Scrap percent	Material Cost Subtotal
PP Resin	$0.690	0.800				0%	$0.5520
						0%	$0.0000
						0%	$0.0000
						0%	$0.0000
						0%	$0.0000
						0%	$0.0000
						0%	$0.0000
					Total Material Cost:		$0.5520

Purchased Component Detail

Part Number	Desciption	Quantity Per Vehicle	Cost Each		Process Cost Subtotal
444 XYZ 888	Dial	1	0.138		$0.1380
					$0.0000
					$0.0000
					$0.0000
					$0.0000
					$0.0000
					$0.0000
			Total Purchased Components		$0.1380

Process Cost Detail

Process Description	Machine Tonnage or Description	Burden Rate ($/min)	Cycle Time (min)	Parts Out or Cavities	Process Cost Subtotal
Injection	220 T	$2.400	0.100	2	$0.1200
Manufacturing Process				Sub-Total	$0.1200
Manufacturing Overhead		33.3%			$0.0400
		Total Conversion:	0.100		$0.1600

Tool Cost Summary

Description	Stations/Type	Cost
Mold	2 Cavity	$50,000
	Total Tool Cost:	$50,000

w/o Royalty & Fixed sunk costs

Part Subtotal:		$0.8500
% 3.0%	SG&A:	$0.0255
% 0.0%	Profit:	$0.0000
	Logistics:	$0.0400
	Packaging:	$0.0250
	Base Cost:	$0.9405

Volume Quoted: 125,000

Material Weight (kg);	0.800
Surcharge per Kg:	
Surcharge per part:	$0.000
Total Cost (w/surcharge):	$0.9405

Payment Term Dy	60	Calendar Days
Ship Frequency Wk	1	Weeks between each shipment
Lead Time Dy	31.5	Calendar Days from PO issue to goods received *for in-house use weighted factor from main cost drivers. Install safety stock for longest
Inventory Level Dy	21	Calendar Days at average consumption
Warehouse m2	9.4	Space required for estimated inventory average

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TABLE 2 - INTERCOMPANY COST BREAKDOWN

LAUNDRY PLASTICS CHINA

Material Cost Detail

Raw Material Economics Price Date: 01-mar-11 | Price w/ Contract Currency: Yuan | Fx rate to Peso: 1.82121

Material/Part Description	Base Unit Cost (KG or Per PC)	Grs Wght (KG) or Part Qty	Material Size L	W	T	Scrap percent	Material Cost Subtotal
PP Resin	$0.656	0.810				0%	$0.5310
					Total Material Cost:		$0.5310

Purchased Component Detail

Part Number	Description	Quantity Per Vehicle	Cost Each		Process Cost Subtotal
444 XYZ 888	Dial	1	0.131		$0.1311
					$0.0000
					$0.0000
					$0.0000
					$0.0000
					$0.0000
					$0.0000
				Total Purchased Components	$0.1311

Process Cost Detail

Process Description	Machine Tonnage or Description	Burden Rate ($/min)	Cycle Time (min)	Parts Out or Cavities	Process Cost Subtotal
Injection	250 T	$2.000	0.100	2	$0.1000
Manufacturing Process				Sub-Total	$0.1000
Manufacturing Overhead		12.5%			$0.0125
			Total Conversion:		$0.1125

Tool Cost Summary

Description	Stations/Type	Cost
Mold	2 Cavity	$50,000
	Total Tool Cost:	$50,000

w/o Royalty & Fixed sunk costs

Part Subtotal:		$0.7746
SG&A:	2.0%	$0.0155
Profit:	2.0%	$0.0155
Logistics:		$0.0231
Packaging:		$0.0750
Base Cost:		$0.9037

Volume Quoted	125,000	
Material Weight (kg);		0.810
Surcharge per Kg:		$0.000
Surcharge per part:		$0.000
Total Cost (w/surcharge):		$0.9037

Payment Term Dy	90	Calendar Days
Ship Frequency Wk	4	Weeks between each shipment
Lead Time Dy	84	Calendar Days from PO issue to goods received *for in-house use weighted factor from main cost drivers. Install safety stock for longest
Inventory Level Dy	35	Calendar Days at average consumption
Warehouse m2	15.6	Space required for estimated inventory average

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TABLE 3 - OUTSOURCING COST BREAKDOWN

INYECCION ESPECIALIZADA

In case of peso, show the % of cost driven by US$

Raw Material Economics Price Date: 01-mar-11 | Price w/ Contract Currency: Peso | Fx rate to Peso or US$ %: 0.8

Material Cost Detail

Material/Part Description	Base Unit Cost (KG or Per PC)	Grs Wght (KG) or Part Qty	Material Size L	W	T	Scrap percent	Material Cost Subtotal
PP Resin	$0.690	0.790				0%	$0.5451
							$0.0000
							$0.0000
							$0.0000
							$0.0000
							$0.0000
					Total Material Cost:		$0.5451

Purchased Component Detail

Part Number	Description	Quantity Per Vehicle	Cost Each		Process Cost Subtotal
444 XYZ 888	Dial	1	0.150		$0.1500
			Total Purchased Components		$0.1500

Process Cost Detail

Process Description	Machine Tonnage or Description	Burden Rate ($/min)	Cycle Time (min)	Parts Out or Cavities	Process Cost Subtotal
Injection	200 T	$3.000	0.100	2	$0.1500
Manufacturing Process				Sub-Total	$0.1500
Manufacturing Overhead		29.2%			$0.0438
		Total Conversion:	0.100		$0.1938

Tool Cost Summary

Description	Stations/Type	Cost
Mold	2 Cavity	$50,000
	Total Tool Cost:	$50,000

w/o Royalty & Fixed sunk costs

Part Subtotal:		$0.8889
% 3.5%	SG&A:	$0.0311
% 5.0%	Profit:	$0.0444
	Logistics:	$0.0306
	Packaging:	$0.0500
Base Cost:		$1.0450

Volume Quoted: 125,000

Material Weight (kg);	0.790
Surcharge per Kg:	$0.000
Surcharge per part:	
Total Cost (w/surcharge):	$1.0450

Payment Term Dy	45	Calendar Days
Ship Frequency Wk	1	Weeks between each shipment
Lead Time Dy	14	Calendar Days from PO issue to goods received *for in-house use weighted factor from main cost drivers. Install safety stock for longest
Inventory Level Dy	6	Calendar Days at average consumption
Warehouse m2	2.7	Space required for estimated inventory average

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The traditional cost analysis shows that the China source is more competitive in landing materials and components to their manufacturing plant, most likely due to the advantage of themselves having Tier 2 sources locally.

Conversion cost per hour in China is much more competitive in China compared to Mexico, thanks to their lower labor rates.

TABLE 4 - TRADITIONAL COST BREAKDOWN

		Suppliers	HAVAP DE MEXICO (QRO) ESTIMATION COST	LAUNDRY PLASTICS CHINA	INYECCION ESPECIALIZADA
		Target 1.0250			
A		Manufacturers category	In-House	Intercompany	Supplier
		Country & City	Qro., MX	Shenzhen, CH	Cuautitlan, MX
B		Price with Contract Currency	Dollar	Yuan	Peso
	1	Raw Materials & Components	$ 0.6900	$ 0.6621	$ 0.6951
	2	Inbound logistics	$ 0.0400	$ 0.0231	$ 0.0306
I		Landed Cost of Raw Materials & Components	$ 0.7300	$ 0.6852	$ 0.7257
	3	Manufacturing Process Cost	$ 0.1200	$ 0.1000	$ 0.1500
II		Sub-Total of Variable Costs	$ 0.8500	$ 0.7852	$ 0.8757
	4	Manufacturing Overhead Costs	$ 0.0400	$ 0.0125	$ 0.0438
III		Conversion Cost	$ 0.1600	$ 0.1125	$ 0.1938
	5	Total Cycle Time (Hr,)	0.002	0.002	0.002
	6	Conversion Cost / Hr.	96.0	67.5	116.3
	7	Sunk SG&A Variable Cost	$ 0.0134	$ -	$ -
IV		Other SG&A *w/o inspection of finished goods	$ 0.0255	$ 0.0155	$ 0.0311
V		Packaging	$ 0.0250	$ 0.0750	$ 0.0500
VI		Profit	$ -	$ 0.0155	$ 0.0444
C		Piece Cost	$ 0.9539	$ 0.9037	$ 1.0450

However, when adding the cost of logistics to get the parts from the manufacturing plant to HAVAP de México, of course in-house manufacturing option shows $0 as all of the logistics costs in that case are for bringing in materials and components. So the advantage that the China source had with the traditional source is washed away by the additional outbound logistics. Inventory carrying costs and storage costs as expected are higher due to the longer lead time and now make this option less competitive than in-house manufacturing by HAVAP de México.

Regarding the outsource option, this also becomes less competitive than the in-house option due to the same logic of outbound logistics to get .the parts to HAVAP de México.

TABLE 5 - TRADITIONAL COSTS PLUS HIDDEN COSTS BELOW OPERATING PROFIT

	Suppliers	HAVAP DE MEXICO (QRO) ESTIMATION COST	LAUNDRY PLASTICS CHINA	INYECCION ESPECIALIZADA
D	EX-Works/CIF/FOB	In-House	FOB Shangai	CIF
E	Cost reduction Plan (annual %)	0,0,0,0,0,0	0,0,0,0,0,0	0,3,3,3,0,0
F	Cost of Terms of Payment (Dy) STD Days 51.7	-0.2%	-0.7%	0.1%
G	Financial Cost of Inventory Holding YR Rate 7%	0.41%	0.68%	0.12%
H	Storage Cost (m2/mth) $ 0.42	$ 0.0004	$ 0.0006	$ 0.0001
	Outbound Logistics Costs	0.00%	6.64%	2.93%
	（CIF, EX-Works,Milk-Run)	$0.0000	$0.0600	$0.0306
I	Total Sourcing Cost	$0.9566	$0.9637	$1.0783

Even though quality and specially foreign exchange risk prediction's accuracy can be low, it should be taken under consideration for decision making, as it is based mainly on historic data.

In this case, foreign exchange rate from Mexican Peso to Chinese Yuan and from Chinese Yuan to US Dollar has been volatile in the recent years and is already significantly higher currently at almost 16% above the rate from the date of the quotation. So there is a possibility that the Chinese source will try to update their pricing and in that case the NPV-R calculated later can change the sourcing decision.

Obsolescence risk and liability of open orders is higher with the Chinese source due to the aforementioned longer lead time.

The outsource option provides the smallest risk, but does not compensate their lack of competitiveness.

TABLE 6 - TABLE OF RISKS AND OPPORTUNITIES:

	Suppliers	HAVAP DE MEXICO (QRO) ESTIMATION COST	LAUNDRY PLASTICS CHINA	INYECCION ESPECIALIZADA
J	Ship. Reject Ratio Poor Quality Mgmt 0%	0.8%	0.2%	0.6%
K	Currency	Dollar	Yuan	Peso
	Fx Quoted Vs. PESO	$12.5000	$1.8212	$0.8000
	Fx RISK Vs. PESO Cost Up Risk	2.9%	17.6%	0.0%
L	(Annual Revenues) (H x Annual Volume)	$119,573	$120,458	$134,790
M	Vender tooling cost (Investment Amount)	$50,000	$50,000	$50,000
N	Grand total (I+J)	$169,573	$170,458	$184,790
O	Sunk SG&A Fixed Cost *D&A idle capacity, etc.	$ -	$ 11,546	$ 11,546
	Total Net Present Value (Piece Cost)	$602,773	$618,411	$650,793
P	NPV-R (Improvement Vs. Current or Make Vs. Buy)	-0.83		
Q	Min.Yr.Vol.=NPV-R 1.0 or 1.2 (High Risk)	2,069,958		
R	Peak volume before additional investment	500,000		
S	NPV if risk's happen	$623,335	$719,678	$654,685
T	Inventory $ Tied up	$10,433	$16,473	$3,265
U	Liabilility (Open Orders)	$15,649	$39,535	$7,619

The 3 sources studied are eligible since they all meet the minimum score of 3 in each applicable category.

However, the highest overall weighted score is achieved by HAVAP de Mexico, followed closely by the Chinese inter-company. The outsource supplier's overall score is calculated by the criteria for suppliers with no development capability, since in this case the manufacturing will be made to a spec. which will be provided to them.

TABLE 7 - QDCDM COMPARISON TABLE:

Weight per factor if no R&D is required

Weight per factor if no R&D is required

Minimum acceptable is 3 for each and every

QDCDM Supplier Evaluation (QDCDM Evaluation with Common Assessment ; 5-4-3-2-1)

w/o Develop	Pillar	with Develop	HAVAP DE MEXICO (QRO) ESTIMATION COST	LAUNDRY PLASTICS CHINA	INYECCION ESPECIALIZADA
30%	Quality	30%	4	3	3
25%	Delivery	25%	3	3	4
25%	Cost	25%	3	4	3
0%	Development	10%	4	5	0
20%	Management	10%	4	3	3
100%	Weighted QDCDM score	100%	3.50	3.45	3.25

The Net Present Value Return Analysis to determine if investing in the in-house manufacturing option (lowest Total Net Present Value) will provide enough savings compared to the intercompany purchase (second lowest Total Net Present Value) shows that even though in-house production is cheaper than intercompany purchase, the savings are insufficient to recover the investment in the depreciation period of the project life.

The project would require a much higher volume to add up the savings required meeting the NPV-R criteria and more investment would be required to support such volume, which in the end evidently makes unfeasible investing for in-house manufacturing.

TABLE 8 - NET PRESENT VALUE RETURN SHEET

Country	Discount rate	Income tax ratio	Local currency
Mexico	8.0%	40.0%	MXN

Volume	SOP	Vol/Year	N	N+1	N+2	N+3	N+4	N+5	N+6	N+7	N+8	N+9	N+10	Total
(1) Thousands per year	01-ago-13	125		125	125	125	125	125						625
(2)														
(3)														
(4)														
(5)														
Total		125		125	125	125	125	125						625

Cash-In [+] Benefit	MXN	K-MXN		N	N+1	N+2	N+3	N+4	N+5	N+6	N+7	N+8	N+9	N+10	Total
(1) Savings per year	12.5	11.1	Avg.		11	11	11	11	11						55
(2) *should discount expense	Fx Dollar to Peso														
Total	12.5	11.1			11	11	11	11	11						55

Cash-Out [-]	MXN	K-MXN		N	N+1	N+2	N+3	N+4	N+5	N+6	N+7	N+8	N+9	N+10	Total
(1) Investment per year	12.5			-156											-156
(2) Jigs & Fixtures															
Total	12.5			-156											-156

			N	N+1	N+2	N+3	N+4	N+5	N+6	N+7	N+8	N+9	N+10	Total
Effect amount	(Cash-In) + (Cash-Out)	5	-156	11	11	11	11	11						-101

CAPEX [-]	Depreciation	K-MXN	Year	N	N+1	N+2	N+3	N+4	N+5	N+6	N+7	N+8	N+9	N+10	Total
(1)	Mold		5												
(2)															
Total															

Amortization expense	Depreciation	K-MXN	Year	N	N+1	N+2	N+3	N+4	N+5	N+6	N+7	N+8	N+9	N+10	Total
(1)	Mold		5												
(2)															
Total															

		N	N+1	N+2	N+3	N+4	N+5	N+6	N+7	N+8	N+9	N+10	Total
Equipment investment amount													
└ PV	Discount rate: 8.0%												
Effect amount		-156	11	11	11	11	11						-101
Amortization expense													
Before tax profit		-156	11	11	11	11	11						-101
Corporate Tax	Income tax ratio: 40.0%		-4	-4	-4	-4	-4						-22
Post Tax profit		-156	7	7	7	7	7						-123
Amortization expense collection													
Effect amount after post tax		-156	7	7	7	7	7						-123
└ PV	Discount rate: 8.0%	-156	6	6	5	5	5						-130
Final NPV:	-130	-156	-150	-144	-139	-134	-130	-130	-130	-130	-130	-130	-130
Recovery year			-	-	-	-	-	-	-	-	-	-	
NPV-R:	-0.83												

Min. Vol/Yr for NPV-R	
2,069,958	1.0
Max. Vol/Yr Next Invest	
500,000	196.88

Function Find Objective

K-MXN

The qualitative analysis shows that the intercompany from China has advantages mainly related to tooling & first parts lead time and LCC content, but also risks and inefficiencies related to the longer lead time for mass production.

This analysis also shows that the outsource option from Mexico State has advantages related to shorter lead time and inventory levels.

In-house manufacturing shows the least risks but also the least advantages. It is a conservative option from the qualitative point of view.

TABLE 9 - QUALITATIVE FACTORS TO CONSIDER FOR SOURCING DECISIONS

Qualitative Factor	HAVAP DE MEXICO (QRO) ESTIMATION COST	LAUNDRY PLASTICS CHINA	INYECCION ESPECIALIZADA	Score (Best ... Worst)
Risk of Country (Disruption due to political issues or natural disaster)	3	2	3	4,3,2,1
Flexibility to manage engineering changes *Time to adopt running changes	52.5	119	20	Calendar Dy
Flexibility to handle changes in customer demand *frozen time fence	7	45	14	Calendar Dy
Capability to supply other HAVAP facilities in the world	Global	Global	Regional	Global, Regional, Local
Tooling Lead Time *consider longest for in-house	140	112	168	Calendar Dy
Material/Parts Mass Production Lead Time *consider weighted for in-house	31.5	84	14	Calendar Dy
Lead time for 1st. Parts	175	147	176	Calendar Dy
Transit Time	28	28	1	Calendar Dy
Space Required (M2)	9	16	3	less is better
Risk of Obsolescense (US$K)	$ 26,082.02	$ 56,008.23	$ 10,884.97	lower is better
Financial Rank of Supplier	B	B	C	A,B,C,D
Financial Risk of Supplier *β from Stock Exchange if available	1.25	1.10	1.50	<N Value=<Industry Risk
Is there enough capacity projected?	Yes	Yes	Yes	Yes & No (disqualified)
Labor union situation	OK	No Union	OK	No Union, OK, Contract Expiring, Strike Risk
How does this commodity fit in the company's capabilities	Core	Core	Core	Core, Secondary, Under Development
How does this commodity fit in the company's commercial strategy	Desired	Desired	Desired	Critical, Desired, Exit
Sourcing mid-term strategy	In-House	Intercompany	Dual Sourcing	*options: In-House, Intercompany, Bundle effect, Dual Sourcing
LCC content	80%-40%	>90%	80%-40%	>80%, 80%-40%, <40%
Is there any concern of conflict of interest or compliance?	No	No	No	No & Yes (disqualified)
Intelectual Property	No Patent	No Patent	No Patent	CK Property, No Patent, Supplier Property
Technology Available	Common	Common	Common	CK, Common, Specialized, Unique

Based on the above build-location versus buy analysis, these are the answers to the questions made for the case:

1. Identify the volume for breaking point to tilt decision from in-house to outsource.
   2,069,958 units per year in this case is the minimum required to achieve the 1.0 Net Present Value Return (NPV-R) factor expected by the corporation to approve an investment. This program however from the customer is for only 125,000 units per year.

2. If the volume over the program increases beyond the plan or drops well below the plan, what are the contingency plans & what investment would be needed for additional capacity if required?
   The investment needed is $96,880 Mexican Pesos for every 500,000 incremental units per year to build new tools, assuming machinery and equipment have enough capacity; this which would need to be confirmed of course.
   In case of volume drop, unamortized fixed costs would need to be negotiated with the customer.

3. What makes one supply chain better than other, regardless of the initial cost of material?
   The capacity to react to the market in a quick and efficient way, minimizing working capital (especially inventory) and risks (inflation, foreign exchange rates, market fluctuation, etc.); while securing long term profit for business sustainability.

4. What could be best, global production or localizing to the respective market?
   In this case, we propose global production with a supplier at one of the markets being attended.

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SELECTED SOLUTION

Purchase from intercompany Laundry Plastics in China

TABLE 10 - SOURCING PROPOSAL SHEET

Sourcing Proposal

Model	Name of Part or Commodity		
Versatile	Knob. for Wash Cycle		
Part Number		**Annual Volume**	**Model Life (Years)**
456 123 789		125,000	5

	Competing Sources		
Type of Source	In-House	Intercompany	Supplier
Source	HAVAP DE MEXICO (QRO) ESTIMATION COST	LAUNDRY PLASTICS CHINA	INYECCION ESPECIALIZADA
QDCDM Scores			
Quality	4	3	3
Delivery	3	3	4
Cost	3	4	3
Development	4	5	0
Management	4	3	3
Weighted QDCDM	3.5	3.45	3.25
Cost Factors	Includes financial costs		
NPV-R	-0.83	*0> is direct reject. 1>only to manage risk	
Landed Cost	$ 0.9539	$ 0.9637	$ 1.0756
Total Sourcing Cost	$ 0.9566	$ 0.9637	$ 1.0783
Vendor Tooling Cost	$ 50,000	$ 50,000	$ 50,000
Sunk Cost	$ -	$ 11,546	$ 11,546
NPV	$ 602,773	$ 618,411	$ 650,793
QA & FX Risks	3.72%	17.82%	0.65%
NPV with Risks	$ 623,335	$ 719,678	$ 654,685
Obsolescence Risk	$ 26,082	$ 56,008	$ 10,885
Qualitative Factors			
Strengths	Flexibility	LCC content Lead time 1st parts	Production Lead Time Flexibility Obsolescence risk
Weaknesses	Lead time 1st parts	Flexibilty Obsolescence risk	Financial Risk Lead time 1st parts

Selected Source LAUNDRY PLASTICS CHINA

Reason for Selection

- ☐ Development Needs
- ☐ Quality First
- ☐ Ensure Delivery
- ☑ Best NPV-R
- ☐ Other

Sourcing Committee Approval

Department	Name & Date	Comment
☑ Procurement		Monitor closely Yuan FX Rate. If risk happened, NPV-R for in-house would be 2.43
☑ Cost Management		
☑ Quality Assurance		
☑ D&D		
☑ Engineering		
☑ SCM		Low flexibility. Need to manage inventory & firm orders to avoid obsolescence.

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REASONING FOR SELECTION:

- Even though the Total Sourcing Cost (Piece Price + Financial costs of Payment Terms, Inventory and Storage + Outbound logistics) is the 2nd best, 0.5% above in-house option, NPV-R (Net Present Value Return Factor) calculated at 1.0 shows a minimum of >2 Million pieces per year to approve the investment. However, the customer requires only 125 thousand pieces per year, so the in-house manufacturing option is not viable from a Capital Expenditure approval perspective.

- Lead time for 1st parts requiring new or modified tooling is 4 weeks lower than the other options.

- LCC (Lead Competitive Country) content is highest, securing competitive costs

- The proposed source, even though is not the highest ranked according to the QDCDM (Quality, Delivery, Cost, Development, Management) score, is considered to be a reliable source that meets HAVAP's criteria to be in included in the AVL (Approved Vendor List).

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CONSIDERATIONS TO WATCH FOR SELECTED SOURCE:

- China country risk is highest, and although uncontrollable must be acknowledged
- Running changes will take 2 months more for adoption with Laundry Plastics China compared to in-house, due to high inventory and open orders required for the source.
- Risk of obsolescence is double compared to in-house, due to high inventory and open orders required for the source.
- Lower flexibility to customer demand due to higher frozen period related to longest manufacturing + transit times.
- Exchange rate risk is high and if realized it could change the decision

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DISCARDED SELECTION METHODS

a) Direct Unit Price comparison, regardless of tooling cost; under the assumption that as long as it's below the customer's budget it's recoverable.

Discarded because it does not consider financial costs and risks that are below the operating expenses in the P&L statement

Besides, every company must understand it competes as part of a supply chain and should support customer profitability as well.

b) NPV of unit price multiplied by volume for model life with no discount applied + tooling cost.

Discarded because it is a technical mistake to not apply a discount rate to future expenditure and add it to a heavy sum of tooling.

c) Based only on pre-determined commercial strategy: i.e. make or buy; local or global source.

Discarded because without a strategic business advantage beyond the commercial aspect, decisions should be focused on adding value to the stakeholders.

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PERSONAL CONCLUSIONS

Nowadays corporations and brands have a need for suppliers that have a global footprint to serve several countries at the same time, while securing the lowest delivery time and with strong focus on low cost, The purpose is to realize as many sales having the product earlier to the market and taking advantage of the economy of scales.

Consumers are not as patient as before to wait for their favorite brand to be available. They will buy a product that can satisfy their needs and that is available when buying.

First to market can be achieved by remote locations that are the most cost competitive despite a longer first to market time, but to fulfill replenishment orders speed may be the most important point to consider to realize as many sales as possible by having product available.

Corporations tend to issue Requests For Quotation to suppliers from different locations and then cherry pick the best prices in each country setting them as targets for any given global supplier, not caring that each individual supplier might be more competitive than the others in a specific location due to a particular reason.

The challenge for companies pretending to be the suppliers is how to be competitive and profitable in all markets served in these global projects. Labor rates and manufacturing efficiencies in China, Germany, Mexico or USA are so different. Therefore automation levels are also different in order to leverage such labor rates.

Another important factor is the lead time involved in moving raw materials, components and goods across the globe. Total Delivery Cost is an important factor, but not the only one. The level of raw material integration in these countries also varies dramatically. Mexico for example has to import most raw materials. It has oil, but not plastic resins. Aluminum must be imported and steel is of lower grade than others in the world.

Of course, benchmarking is important for companies to be more competitive, but my preferred strategy for a company is to be “Glo-cal”; meaning, standardize “globally“ concepts, processes and quality, but leverage “local” strengths of each plant and country.

Serious and responsible corporations and brands should allow their supply base to have sustainable profits in order to nurture long term win-win relationships, understanding that finally the whole supply chain is competing versus another whole supply chain, and not just one corporation or brand versus another corporation or brand.

One common mistake that global companies make is to measure financial performance of their branches mainly with OP (Operating Profit), due to the complexity of isolating in the analysis the effect of royalties and global overhead. This may drive to mistaken sourcing decisions since costs below OP will be considered irrelevant; for example inventory carrying costs and warranty claims.

Risks by definition are a guess, sometimes based on statistics and other times based on mere empirics. However, these risks must be assessed ideally with a standard method or criteria.

The financial rule of "The higher the risk the higher the benefit" should be always in our mind, as maybe the "most competitive" source could be the "riskiest". This is a subjective matter that has a significant relevance for business decisions.

The most representative risks for supply chain management are poor quality costs, late deliveries and premium freight, obsolescence and slow moving inventory, foreign exchange rate fluctuations, market fluctuations for raw materials, financial risk of suppliers, intellectual property issues, bureaucracy and political environment in different countries, and union strikes among others.

One final and important consideration is to use the fixed cost ratios that are projected when a new product will be in production. It is easier to use the ratios effective on the date the quotation is being prepared, but that assumes that our whole company structure will not become more competitive.

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REFERENCES AND SOURCES:

- By Hoovers, a D&B Company (2013)
  Household Appliance Manufacturing Industry Overview
  Recovered from:
  http://www.hoovers.com/industry-facts.household-appliance-manufacturing.1168.html
- By Lucintel (Jun 2012)
  Global Household Appliance Industry 2012-2017:
  Trend, Profit and Forecast Analysis
  Recovered from:
  http://www.researchandmarkets.com/reports/2313024/global_household_appliance_industry_20122017

- By Ibis World (Jun 2013)
  Washer & Dryer Manufacturing in the US: Market Research Report
  Recovered from:
  http://www.ibisworld.com/industry/washer-dryer-manufacturing.html

- By Servicio de Administración Tributaria (Nov 2013)
  US Dollar Exchange Rate History
  Recovered from:
  http://www.sat.gob.mx/sitio_internet/asistencia_contribuyente/informacion_frecuente/tipo_cambio/
- By FreeCurrencyRates.com (Nov 2013)
  Chinese Yuan Exchange Rate History
  Recovered from:
  http://www.freecurrencyrates.com/es#EUR;USD;1;;Yahoo%20Finance

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ATTACHMENTS:

Excel file “Final Case Study – Ramon Ruvalcaba Alonso.xls”

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