Huskie Motor Corporation: Visualizing the Present and Predicting the Future.

INTRODUCTION

Organizations create and collect massive amounts of data as result of their day-to-day operations. Frequently referred to as "Big Data" it represents an important asset for the organization. Big data presents both opportunities and challenges for accounting professionals. Accounting professionals are expected to know how data is created, collected, stored, and accessed. As the custodians of the organization's assets accountants are expected to understand and implement controls over the storage and use of the organization's data. Further, as business professionals we are expected to know how to use this vast source of data to make better business decisions and identify potential risks. Understanding how to use data to formulate and solve business problems provides an opportunity for the accounting professional to become a forward thinking strategic partner in the organization. The challenge for accountants is to develop the skill set needed to extract value from big data through advanced analytics.

One skill that is becoming increasing important for analysis of large data sets is data visualization. Data visualization is the process of displaying data to provide insights that will support better decisions. Gartner's 2017 report on business intelligence and analytics platforms states that "the visual-based exploration paradigm has become mainstream". Gartner identifies three platforms as leaders in the visualization platform: Tableau, Microsoft, and Qlik. All three products provide relatively easy to use data visualization tools.

Huskie Motor Corporation Background

Huskie Motor Corporation (HMC) is an automobile manufacturing company with production and sales throughout the world. Automobile manufacturing and sales is a complex and highly competitive business. Although the automotive industry has a broad global reach, 15 companies produce 88% of the world's vehicles (http://marketrealist.com/2015/02/intense-competition-leads-low-profit-margins-automakers/). HMC is a new and a smaller player in the automotive manufacturing market. However, they have some very popular brands and high customer satisfaction. If they are to survive, they must fully understand their markets, customer base, and costs to keep profit margins positive. However, they have some very popular brands and high customer satisfaction; both are critical assets as this stage of the game.

Miranda Albany started with HMC as a senior cost analyst three years ago when the company first began operations after a spin-off from Blue Diamond Automotive, a large auto manufacturing company. Recently promoted to Assistant Controller, Miranda is anxious to make a good impression on her boss. She has advocated a "data-driven" strategy for decision making at the company by capturing a vast number of product specific details relevant for both production and marketing. The problem is that the company has grown so quickly, Miranda is having a difficult time keeping up with the massive amounts of data that continue to accumulate. To further complicate matters, there is a growing need for reporting detail and in-depth analysis of product lines given the availability of additional data.

Although Miranda is sure that the data she has collected can help her management team to make better decisions, she doesn't have the time, or the expertise, to figure out how to organize or use the data

effectively. Miranda communicates with HMC's executive team on a weekly basis to convey vital information regarding marketing strategies, sales targets and production needs. However, she feels that her information is often "lost in translation" as the executive team struggles to digest the numbers. Miranda believes that data visualization may be a crucial component in helping her effectively connect with HMC executives. To help her utilize the massive amounts of data at her disposal, Miranda has interviewed a number of consulting firms that specialize in information technology and data engineering. Ultimately Miranda chose D & A Consulting because of their automotive industry expertise and their focus on data analytics and visualization.

Miranda asked Megan Martinez, a senior staff accountant, and Adam Green, a staff accountant, to work with D & A on the project. Megan has been with HMC for two years and recently relocated to the corporate headquarters in Dearborn, MI. Megan is a dedicated employee but she still has responsibilities from her previous position at HMC where she worked with district managers to implement and monitor marketing campaigns. Megan's corporate transition is almost complete and she is anxious to move forward in her current position. Adam is a young aggressive employee who began with the company eight months ago straight out of college. He has a good sense of judgement and is eager to make a good impression on upper management. Adam has shown great initiative and skill with data organization and presentation. He works with product line supervisors to track man-hours and machine time for each car line that HMC produces. Although Megan and Adam have very different knowledge bases, Megan's understanding of product offerings and sales demand combined with Adam's understanding of product costs should create an effective synergy that Miranda hopes to leverage for maximum problem solving efficiency. Miranda believes the two employees will be a good mix of experience and dedication.

D & A CONSULTING GROUP

D & A Consulting was started by Doug Chan and Arlo Paxton five years ago. Doug and Arlo have been friends since college, having graduated with accounting degrees from the same university 15 years ago. Although they went to work at different accounting firms, they both followed similar career paths. After becoming managers at their respective firms, Doug and Arlo decided that their real passion was in teaching clients how to use data to make better business decisions. They started their own consulting firm with one primary focus: helping clients better understand their businesses via the use of data analytics and data visualization. Although data analytics is not a new concept in the business world, the amount of data available, and the number of sources from which it can be captured, has skyrocketed. Driven by lower storage costs and more "user friendly" analysis, software businesses have vastly increased the amount of data they collect and store. However, finding the talent needed to transform that data into useful insights is what businesses find challenging. D & A consulting helps companies fill that void.

Doug and Arlo are excited about the opportunity to work with HMC. They have assigned their automotive industry expert, Kevin Lydon, as the project lead. Kevin has been with D & A nearly as long as the company has been in existence. He and Doug met each other on a consulting project that D & A did for Rambler Automotive. At the time, Kevin was the IT engineer at Rambler. He had a successful career with Rambler but felt that the challenge of working with multiple clients to solve diverse IT issues

was too exciting to pass up. On the HMC project, Kevin will be working with a D & A new-hire, Jan Morrison.

Jan is excited to start on her first client assignment but is somewhat apprehensive. As project lead, Kevin is enthusiastic about mentoring Jan on her first assignment. He is equally enthusiastic about the potential for improvement at HMC. He reassures Jan that this client will be a great opportunity for her to test her data analytics and data visualization skills. Jan did well in her cost accounting classes and completed an internship at a manufacturing company the summer before she graduated. Although Jan is technically competent and has some experience in the manufacturing environment, she has no formal training in data analytics. Jan's experience with data visualization software is limited as well, having only worked with Microsoft Excel using pivot tables and charts. Jan is aware that Kevin is proficient with many data visualization software packages such as Sisense, Tableau, and Domo. She is really hoping to learn a lot from Kevin over the course of this project.

HUSKIE MOTOR CORPORATION - Background

HMC is currently selling in 30 countries grouped into six regions: Africa, Asia, Europe, Middle East, North America, and South America. Table 1 provides a breakdown of the countries within each region.

Table 1
Huskie Motor Corporation
Regions and Countries

Region	Country
Africa	Algeria, Egypt, Ghana, Nigeria, South Africa, Zimbabwe
Asia	Cambodia, China, India, Japan, Laos, Turkey
Europe	France, Germany, Poland, Spain, Sweden, United Kingdom
Middle East	Jordan, Saudi Arabia, UAE
North America	Canada, Mexico, USA
South America	Argentina, Bolivia, Brazil, Chile, Columbia, Venezuela

Automobile manufacturing and sales is a complex and highly competitive business. Although the automotive industry has a broad global reach, only 15 countries produce 88% of the world's vehicles (http://marketrealist.com/2015/02/intense-competition-leads-low-profit-margins-automakers/). HMC is a fairly new and small player in the automotive manufacturing market.

HMC currently offers four brands: Apechete, Jackson, Special, and Tatra. Each brand has several models as detailed in Table 2 below. The models available fall within 12 segments of vehicle types: Compact, Entry-level Luxury, Full-Size, Full-Size Luxury, Micro, Mid-Size, Mid-Size Luxury, Minivan, Sports Coupe, Sports Utility, and Sub-Compact.

Table 2
Huskie Motor Corporation
Brands and Models

Brand	Models Available
Apechete	Chare, Island, Pebble, Robin, Sparro, Stork, Summet, Trido
Jackson	Brutus, Clik, Core, Crux, Lift, Fiddle, Mud, Rebel, Salsa, Wood
Special	Gazelle, Performance, Spark
Tatra	Advantage, Bloom, Jespie, Mortimer, Rambler

HMC offers several series for each model for a total of 55 different series. A breakdown of the available series offered by model is provided below in Table 3. Each model is available in various body styles, engines, drive configurations, transmissions, trim, color, and seat types. Since various engine and transmission builds (Table 4) come from one division and finishing (Table 5) is done in another division, these options are described in different tables.

Table 3
Huskie Motor Corporation
Models and Series

Model	Series	Model	Series
Advantage	A1, A2, A3	**Mud**	Ma1, Ma2
Brutus	Bas 1, Bas 2	**Pebble**	B1, B2
Bloom	Tr1, Tr2	**Performance**	Pa1, Pa2
Chare	C1, Cx2, S1, S2	**Robin**	R1, R2
Clik	Cl1, Cl2	**Rambler**	Ra1, Ra2
Core	Co1, Co2	**Rebel**	Ro1, Ro2
Crux	Cr1, Cr2	**Salsa**	Ba1, Ba2
Lift	E1, E2	**Sparro**	S1,S2
Fiddle	F1	**Spark**	Spr1, Spr2
Gazelle	G1, G2	**Stork**	St1, St2
Island	M1, M2	**Summet**	P1, P2
Jespie	J1, J2	**Trido**	T1, Tx2
Mortimer	N1, N2	**Wood**	V1, V2

Table 4
Huskie Motor Corporation
Body, Engine, Transmission and Drive Configurations

Body Style	Engine and Type		Transmission	Drive Configuration
Coupe	Diesel	I5, v7, v9, v11, v13	5 Speed Auto	4WD
Crossover	Gas	I5, v7, v9, v11, v13	5 Speed Manual	AWD
Pickup Truck	Supercharged	I5, v7, v9, v11, v13	6 Speed Auto	FWD
Sedan	Turbo	I5, v7, v9, v11, v13	6 Speed Manual	RWD
SUV			7 Speed Auto	
Van			7 Speed Manual	
			CVT	

Table 5
Huskie Motor Corporation
Trim, Color and Seat Types

Trim	Color	Seats
Base	Black	Leather
Deluxe	Blue	Nylon
Extra	Brown	Polyester
Luxury	Champagne	Vinyl
Special Edition	Green	
Sports Edition	Gray	
	Orange	
	Purple	
	Silver	
	White	
	Yellow	

Like many automotive manufactures, HMC offers a variety of packages and options that buyers can add to their vehicles. Packages include a specific set of bundled options, or buyers can choose individual options separately. Table 6, shown below, provides a list of the eight packages along with the detail of products and services contained in each package. Table 7 provides information regarding options which may be purchased ala carte, however; at least one option is contained in each available package.

Table 6
Huskie Motor Corporation
Package and Package Details

Package	Package Details
Appearance Package	Leather seats, styling kit, moon roof, moon roof spoiler, sunshade, and auto dimming mirror
Exterior Protection Package	Clear coat add on with peck/scratch warranty, exterior add on, lane change alert system, door strip dent protectors
Handling Package	Smart key system, keyless entry keypad, push button start, automatic/manual transmission, anti-lock braking system
Interior Package	Multi-media bundle with high-res touch screen, premium radio, six speakers, advanced voice recognition, hands-free phone capability
Parking Technology Package	Auto dimming rear view, parking assist, power mirror, on board back up camera, contact sensor alerts, auto adjust side view mirrors
Summer Package	Emergency assistance, stolen vehicle locator software, styling kit, predictive traffic, hands-free GPS and compass
Super Fuel Economy Package	Low fuel alert system, miles to empty indicator, remote start, fuel efficient cruise control, hybrid option
Technology Package	Pre-collision system, parking assist, lane departure alert, auto high beams and compass

Table 7
Huskie Motor Corporation
Option Add-Ons

Exterior add on
Keyless entry keypad
Moon roof
Parking assist
Power mirror
Premium radio
Remote start
Styling kit

DATA DILEMMA

Prior to calling Miranda at HMC, Kevin meets with Jan to go over some basics regarding the project. Kevin uses a 5-step model as a data analytics framework. As a first step, he explains this model to Jan because he believes it will help her understand his process.

Kevin: "So, Jan, this should be an interesting client and project. I know you are a bit nervous about your lack of experience with data analytics design, but I have been studying this stuff for a long time, both from an applied as well as a theoretical perspective. There is a great book on this subject, *Data Analytics,* by Warren Stippich and Bradley Preber. In this book, the authors describe a 5-step approach to the data analytics process: (1) Define the question, (2) obtain the data, (3) clean and normalize the data, (4) analyze the data and understand the results, and (5) communicate the results. I think that understanding and following these steps will help you tremendously as you try to find your footing on this engagement. Our client, HMC, would like to have the project finished within a four to six week timeframe. How do you feel about that?"

Jan: "That seems like a pretty short window, Kevin. Do you think we can finish within that time frame?"

Kevin: "Well, I don't think we can set a realistic time frame without knowing exactly what our challenges are and what the data looks like. Remember, we have to be able to trust our numbers. We don't know yet whether the data is clean. We will have to do some validity testing first. Remember, follow the steps, think it through, and keep a calm head."

Jan: "What exactly is our goal for HMC?"

Kevin: "Basically, HMC captures very detailed transaction specific data. The amount of data they have is overwhelming for both the HMC management team and the executive board. Our job is to help Miranda and her team figure out how to use their data to better understand costs and profitability by vehicle model. They also need detailed, relevant feedback regarding sales volume and sales location for planning purposes. Miranda would like to be able to predict sales at least three quarters out so that the management team can better plan production schedules."

"An equally important goal is to help them understand the benefits of data visualization and give them some ideas about how to present the data to their executive board. As you know, Jan, data visualization software, such as Tableau and Qlik, allows us to turn large volumes of raw data from various sources into easily comprehensible graphical representations of information. Data can be accessed live or extracted from some other source. Data can also be presented in summary fashion while preserving the underlying detail which can be instantaneously viewed as desired. This type of technology could be instrumental in helping HMC improve and maintain its competitive advantage."

Jan: "How do they store the data and will we be able to integrate it with the visualization software?"

Kevin: "The actual sales data will likely come from their ERP system. We will need to confirm that at our initial client meeting. We should be able to get transaction specific information at the vehicle identification number (VIN) level since the VIN is a unique identifier. I'm not sure how much information is being collected at the individual vehicle level, but that could be a rich data source for us if we can get it. We will, however, need to resolve our questions during our introduction call."

Jan: “Is the data they have ready to be used or will we need to verify and organize it?”

Kevin: “We will see just how clean it is once we start pulling it in. We will initially build the analysis using a representative sample of their data. The sample represents about 25% of the total company data. The four to six week timeframe should be feasible if we receive clean data. Our contact at HMC, Miranda, is assigning two accountants from the controller’s department to pull the sample and help clean the data. Once the client approves of the proposed analytics and the dashboard we can roll it out using all the data.”

Jan: “Will using a sample be enough to convince the client of the value of the analysis?”

Kevin: “Absolutely. The sample allows us to determine what type of analyses we can provide, by looking not only at the data, but at the format of the data as well. We can use the sample data to create demonstration dashboards for the client. The analyses we perform with the sample can then be recreated for the full data set.”

Jan: “I’m not sure I understand what you mean by a ‘dashboard’?”

Kevin: “Basically a dashboard is a screen that consolidates visualizations, graphs, charts, etc., to concisely display the metrics and key performance indicators for a business. Summarized data can come from a variety of sources and can even be presented in real-time.”

Jan: “I can’t wait to get started! This is going to be a tremendous learning opportunity for me.”

After reviewing the project proposal and meeting with Jan, Kevin calls Miranda to introduce himself and confirm their initial meeting the following week.

Kevin “Hi Miranda, this is Kevin from D & A consulting. I just wanted to touch base with you to set up our initial meeting.”

Miranda – “Hi Kevin, I am really looking forward to your team’s visit. We need help as soon as possible. I have so much data coming in that I barely have time to look at it, much less analyze it. Also, our data is located in various databases, spreadsheets and our ERP system, making it difficult to integrate and fully utilize. We have data visualization software available on our server but we haven’t really tapped in to its capabilities just yet. I’m told that we can easily pull together large amounts of data from various sources with user-friendly, adaptable output using dashboards. Is that something you can help us with?”

Kevin: “Absolutely. What kind of data visualization software do you have?”

Miranda: “Tableau, it’s supposed to be very user-friendly. I am hoping you can get a dashboard up and running in a couple of weeks.”

Kevin: “Do you know what you want on the dashboard?”

Miranda: “I know that we want to be able to see profitability by brand and model, since solid profit margins are crucial if we want to stay in business. We also want to keep a pulse on sales by country and region. Ultimately, we want to do a better job of planning our production schedule, but as you know, this requires up-to-date information on many moving parts.”

Kevin: “I can’t say whether a couple of weeks will be enough time until we take a look at the data and map out what specific decisions you are hoping the dashboard will enable you to make. I will have a better idea after our initial meeting next week.”

Miranda: “Ok, fair enough. We will see you on Monday at 1 pm.”

Initial Meeting:

Kevin: **"**So let's get down to business. Let's talk about the dashboard. Help me understand what questions you are trying to answer? Or what story are you trying to tell? Who are the users going to be? Will different users need different dashboards?"

Miranda: "I have a list of questions that I would like to be able to answer using our data.

"There are several areas where I believe we can gain greater insight from looking at our data. Specifically, we need overall performance analytics to tell us how we are performing globally. We need to know which of our models is profitable, where we are selling well and, perhaps, how sales channels are driving sales volume. It is also important that we be able to see information from a top-level perspective with the ability to drill down into the detail. The profitability information is crucial for our executive team: the Chief Executive Officer (CEO), Chief Financial Officer (CFO), the Chief Operations Officer (COO), and the Chief Marketing Officer (CMO). This team is ultimately responsible for the direction of HMC and profitability for shareholders.

"I would like for our management accounting group and financial reporting group, including the CFO, to have a financial analytics dashboard to give them information about contribution margins, total costs, and sales volume. Both groups will also need to monitor changes in costs and contribution margins for all of the models that we offer. These are the most important metrics, and therefore, the ones that we need to work on first. We will expand our analysis for the management accounting group to include other efficiency measures as soon as we can get these initial dashboards up and running.

"Our CMO and the sales team will need operations analytics to help them understand turnover and demand. They will need to know which models are selling and how long it takes to sell them. They will also need to understand how packages and options impact sales. They'll need to have a handle on which of our package/option offerings are popular and which ones are profitable.

"Finally, our budgeting and production teams will need to utilize forecast analytics to predict sales and margins at least three quarters in advance.

"Do you think it's possible to make the dashboards 'real time'?"

Kevin: "I think it's possible but first we need to understand the data that you are currently collecting. What can you tell me about the extent and magnitude of your data?"

Miranda: "Well, we track details down to the VIN level in our ERP system. So, we have a lot of data. For each vehicle sold we know the sales amount, marketing expense, and all variable and fixed costs. We also track a lot of non-financial data."

Kevin: "What kind of non-financial data?"

Miranda: "Well, there is vehicle data such as Brand, Model, Model Year, Series, Segment, Body Style, Drive Configuration, Engine type, and Transmission type. We also have the detail for each vehicle sold as far as color, trim, etc., as well as any package or options purchased."

Jan: "Wow! I can see why the dataset is so large!"

Miranda: “That’s just the vehicle information. We also capture the region and country of sale, the number of days that any given car was on the lot prior to sale, and the type of marketing campaign in place at the time of sale. In addition to that, we track sales channel information.”

Jan: “Can you give me a little more detail on what you mean by sales channel information?”

Megan: “Sure. We identify sales using three sales channel dimensions. Sales channel 1 identifies if the sale was made through our dealers, fleet, or retail operations. Sales channel 2 identifies the type of customer account. We have commercial accounts, employee/partner programs, government accounts, non-employee accounts, and rental accounts. The third sales channel identifies whether the sale was cash, financing, or lease.”

Kevin: “Ok, so ideally we will want to use both the financial and non-financial data in our analyses.”

Miranda: “Exactly! Other potentially informative data sources that we have are social media websites like Facebook, Twitter, and Instagram. We have just started collecting data these sources about our vehicles, but we are still trying to figure out the best way to analyze it.”

Kevin: “Eventually we can bring that data into the analysis and dashboard as well but, for now, let’s stick to the data we already have. If you give Jan and me a sample, meaning at least 25% of the most recent data, we will make sure that the data is “clean” by running some data validity tests and then we can start putting together some analytics. Once we have a better feel for the data we can give you a better estimate of how long it will take to develop the dashboards.”

Miranda: “Great! Megan and Adam will make sure you get all the data you need, and they’ll be available to help as well.”

ASSIGNMENT

Assume you are Jan Morrison and that Kevin has asked you to do a preliminary analysis of the data. Specifically, Kevin has asked you to determine the following:

1. Overall Performance Analytics:
    a. How is HMC performing globally?
    b. How are various HMC brands performing?
    c. How are the various sales channels performing?
    d. What are the most & least profitable models?
2. Financial Analytics:
    a. What is the current CM per model?
    b. What the average variable cost per model and how has that changed over time?
    c. Which model has the most variability in variable costs?
    d. What is the current CM per channel?
3. Operations Analytics
    a. What model options are the top and bottom sellers?
    b. How many days are the various models on the lot prior to sale?
4. Forecast:
    a. Sales Volume - 4 quarters in advance (Hint: use Trendline option in Excel or Forecast option in Tableau)
    b. Contribution Margin - 4 quarters in advance (Hint: use Trendline option in Excel or Forecast option in Tableau)

Once you have prepared the analysis Kevin would like you to prepare an interactive dashboard for each of the four areas described earlier. The client uses Tableau for data visualization and would like you to create the dashboards using that software. Kevin has also given you guidelines for preparing a draft of the business report (see below) that will be delivered to HMC along with the dashboards.

DELIVERABLE

You should prepare a business report formatted as follows:

I. Title Page
II. Executive summary
    a. Clear and concise information about the problem the report is analyzing.
    b. Main points, conclusions, and recommendations (use bullets or numbered lists to highlight important points).
III. Introduction
IV. Main Body
    a. Follow the order of the questions above.
    b. A paragraph about the relevance of the findings can be included in each section.
    c. Include a discussion of relevant descriptive statistics.
V. Data Tabulations/Visualizations
    a. These should support your findings in the main body.

b. You may include these within the main body if you prefer.

VI. Recommendations
    i. Based on your analysis what should be HMC's course of action? Are there countries, brands, models, options, etc they should increase or eliminate.
    ii. What are the potential implications of those actions? Consider both financial and non-financial implications.

You should also submit a file with your analyses and dashboards.