An Industry Structural Analysis and Strategy Insights for the Commercial Crew Transportation Industry

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Michael Porter’s industry analysis techniques are applied to the emerging commercial crew transportation (CCT) industry to provide insights into strategies operators can take to improve competitive positioning. Michael Porter identified and published his theory of the five forces that shape strategy in 1979. Subsequently Porter has refined and updated his thinking in a series of new publications. This paper is based primarily on Porter’s “The Five Competitive Forces that Shape Strategy” published in 2008. Porter believes competitive advantage arises by offering a unique value proposition, delivered by a tailored value chain, involving trade-offs different from those of rivals, where there is fit among numerous activities that become mutually reinforcing. To create a strategy Porter believes that companies must better understand current competitive forces, anticipate and exploit industry change and the resulting shifts in the forces, and shape the balance of forces to create a new industry structure that is more favorable to the company. This paper uses a Porter five forces industry structural analysis to identify the forces affecting the emerging CCT industry, rates those forces by greatest impact to competition, and identifies some possible strategies that CCT operators may use to improve competitive position.

I. Introduction

This paper applies Michael Porter’s industry analysis techniques to understand the dynamics of the emerging commercial crew transportation (CCT) industry that will affect its profitability and identifies strategies to improve CCT operator positioning. Michael Porter identified and published his theory regarding the five forces that shape strategy in 1980.¹ Subsequently Porter has refined and updated his thinking in a series of new publications. This paper is based primarily on Porter’s “The Five Competitive Forces That Shape Strategy” published in 2008.² Porter believes that many mistakes in strategy proceed from fundamental misconception of what competition is and how it affects an industry. Porter proposes a framework that is grounded in industrial organization economics for assessing competition in any industry. The five-forces framework explains the differences in the average profitability of various industries and the implications necessary for companies to determine how to influence industry competition in their favor. The five forces diagnostic, depicted in Figure 1, consists of the bargaining power of buyers, the bargaining power of suppliers, the threat of new entry, the threat of substitutes, and the intensity of the rivalry.

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Porter identifies basic strategies companies can take to outperform rivals. A company achieves superior profitability in its industry by either attaining higher prices or lower costs. But Porter believes that price or cost difference between competitors arise from two different sources including operational effectiveness and strategic positioning. Operational effectiveness can be described as achieving the best practices or best product and can be a position that is difficult to win. Alternatively profitability differences are most often caused by distinctive strategic positioning or competition to be unique. According to Porter, competing to be unique is ultimately more sustainable than competing to be the best. Porter believes competitive advantage arises by offering a unique value proposition, delivered by a tailored value chain, involving trade-offs different from those of rivals, where there is fit among numerous activities that become mutually reinforcing. Porter believes the best strategies exploit more than one of the following strategic actions:

- Position the company to better cope with the current competitive forces;
- Anticipating and exploiting industry change and the resulting shifts in the forces;
- Shaping the balance of forces to create a new industry structure that is more favorable to the company.

This paper begins in Section II with a description of the emerging CCT industry. The CCT industry dynamics are analyzed in Section II through Porter’s five forces industry framework. Insights into strategies for improving competitive position are discussed within context of each force and summarized in Table 1. Next, a summary of the strategic insights will be organized according to the current impact on competition within the emerging CCT industry. Finally in Section IV, a critique, suggestions for future work on this topic, and acknowledgements are presented.

II. INDUSTRY DESCRIPTION

The scope of the emerging CCT industry is global. Currently only Russia’s Soyuz transportation system is available to purchase for crew transport into low Earth orbit. China also has a capability to transport humans into space but its use is limited currently to China’s own national interests and uses.

A new emerging commercial human spaceflight industry is currently taking shape in the U.S. following the retirement of the U.S. space shuttle. The decision to retire the space shuttle was influenced by a recommendation from the Columbia Accident Investigation Board, following the breakup of space ship Columbia upon return in February 2003. Initially U.S. crew transportation duties were planned to be supplied by NASA via a new Aries rocket and Orion capsule as part of the NASA Constellation initiative. Eventually Constellation was cancelled and the U.S. government turned towards industry to develop a crew transportation system. Proponents of the strategy believe industry will be able to provide a more cost effective transportation system which will in turn free NASA funding to pursue other exploration and science objectives. NASA is currently using Space Act Agreements to stimulate demonstration of technologies that could be used in a crew transportation system. Those technologies are being used by an emerging group of commercial companies that plan to provide crew transportation service to NASA, other sovereign clients, private companies, and space tourists. An assessment of commercial market potential for crew and cargo systems was released by NASA in April 2011 upon request by the U.S. Congress. This assessment reviewed demand originating from non-NASA sources only. However, many emerging commercial CCT developers are counting on NASA as an anchor client.
III. FIVE FORCES ANALYSIS AND STRATEGIC INSIGHTS

A. Force 1: Threat of New Competitors

New entrants into an industry bring new capacity and place pressure on prices, costs, and the rate of investment necessary to compete according to Porter. The raising of barriers of entry is a basic strategy for incumbents. New entrants will seek to minimize the effects of barriers. A few years ago, when only government operated crew transportation systems were in use, it would be logical to identify the barriers to entry in the commercial crew transportation as high. Today, many of the barriers are still significant; however, some barriers have been lowered due to initiatives by the U.S. government such as NASA’s CCDEV contracts which aim to defray some of the costs of new CCT system development along with NASA’s potential willingness to use a fixed price contracting method similar to the Commercial Resupply Services. Concurrently, the regulatory environment has remained favorable to new market entrants. The U.S. Federal Aviation Administration’s approach to licensing of commercial human spaceflight, in order to protect the uninvolved public, has managed to maintain a balance between allowing industry flexibility to innovate and create new approaches to safety while making available and enforcing some of the best lessons learned from past human spaceflight experience. Given these efforts the relative threat of new entrants is high. The following paragraphs discuss specific barriers of entry in detail.

Analysis and Strategy

In the CCT industry, supply-side economies of scale currently represent a medium scale barrier to entry. Supply-side economies of scale, as described by Porter, exist when the incumbent enjoys large unit volumes with lower costs per unit because fixed costs can be spread over more units, or more efficient technology can be employed, or better terms can be commanded from suppliers. Supply side economies deter entry by new entrants. Currently, only a single provider, Roscosmos, supplies space transportation services and enjoys 100 percent market share. However, the impact of its economy of scale is minimized due to the fragmented nature of the international space component supply chain and national protectionism. Roscosmos competitors still control significant market share in related markets such as satellite transportation and cargo resupply services. Strategies to overcome supply-side economies of scale include leveraging of adjacent revenue streams such as transportation of satellites and resupply cargo or other aerospace related business lines.

Demand-side economies of scale currently represent a low scale barrier to entry. Demand-side economy of scale exists, according to Porter, when a buyer’s willingness to pay for a company’s product increases with the number of other buyers who also patronize the company. In the space industry national governments currently serve as large anchor clients that often compose the majority of a CCT provider’s market share. Therefore it will be paramount for new CCT providers to court sovereign clients such as NASA. Strategically, incumbents should incentivize client retention through strong performance but also stimulate customer retention through initiatives such as client networks or clubs where buyers are part of large network of fellow customers. New entrants should offer new unique services in market niches that their competitors may not be serving.

Customer switching costs represent a low scale barrier to entry. Customer switching costs are fixed costs that buyers face when they change suppliers according to Porter. These costs could include alterations to product specification, retraining employees, or modification of other processes or information systems. The basic standard for CCT vehicles is the human body. However, special equipment required to rendezvous and dock with destination in space may increase switching costs. Strategically, incumbents have an incentive to use proprietary standards and other methods to make it difficult for a client to switch providers. Alternatively, new entrants should advocate open standards and highlight the disadvantages of proprietary standards.

Capital requirements represent a high barrier to entry. Capital requirements, according to Porter, represent the need to invest large financial resources in order to compete and deter new entrants. Capital may be needed to fund start-up losses, build inventories, extend customer credit, or construct new facilities. Although the absolute level has declined recently in comparison with historical costs, capital requirements in the space industry are extremely high with large investments in physical infrastructure and research and development required. Strategically, organizations can make it difficult for new companies to raise financing by contrasting publicly the advantages of the incumbent versus the any perceivable shortcomings and therefore investment risk of the competitor. Incumbents must also demonstrate strong performance in order to avoid financiers and buyers from believing new entrants may provide better performance. Alternatively, new entrants should raise sufficient financing by creating strong business plans.
that maximize the financier’s likelihood for return on investment. New entrants may also be able to take advantage of funding opportunities from programs such as NASA’s CCDEV, a program that supports development of CCT related technologies.

Incumbency advantages independent of size represent a medium scale barrier to entry. According to Porter, incumbency may have advantages independent of size such as cost or quality advantages not available to potential rivals. These advantages may include proprietary technology, preferential access to the best raw material sources, the most favorable geographic locations, established brand identities, or cumulative experience leading to efficiencies. In the aerospace industry major companies may have strong name recognition based on years of performance to leverage for advantage. Reliance on national launch infrastructure means that geographic advantages are largely eliminated. Proprietary technology plays an uncertain role with most companies relying on tried and tested technologies. Strategically, incumbents would seek to create and maximize the benefit of incumbency advantages while, new entrants new entrants could seek to create their own or fill niches that create advantages independent of size.

Unequal access to distribution channels represents a low scale barrier to entry. Unequal access to distribution channels can limit a products deployment success according to Porter. Industries that depend on third party distributors may be more strongly affected by this barrier to entry. In the CCT industry brokers have historically served as intermediary channels for sales of orbital spaceflight services. However, the costs associated with direct sales may not be great enough to deter launch operators from using brokers in the future. Strategically, incumbents should attempt to develop sole source agreements with distributors. Alternatively, new entrants should attempt to highlight the cost savings potential of competing manufacturers to distributors in order to gain access to the distribution channel or the new entrant could attempt direct sales to the customers.

Currently, restrictive government policy represents a medium barrier to entry. Restrictive government policy can hinder or aid new entry directly, as well as amplify or nullify the other entry barriers according to Porter. Governments can even eliminate entry into new markets through licensing requirement and restrictions on foreign investment. Strategically, incumbents should lobby to create regulatory or policy barriers to deter new entrants. Alternatively, new entrants must also lobby for conditions favorable to new entrants. In the space industry, government licensing has remained relatively unrestrictive in the U.S. while foreign regimes clearly favor national systems. Uncertainty exists in the regulatory environment that will emerge for orbital CCT industry creating barriers to entry.

A summary of these results are given in Table 1 below.

B. Force 2: Bargaining Power of Suppliers

Companies often depend on suppliers for subcomponents that are used to construct an integrated system. Powerful suppliers, that an industry depend on, can capture more of the value for themselves by charging higher prices, limiting quality or services, or shifting costs to industry participants according to Porter.

Power of suppliers in the CCT industry is medium. The space industry has in general experienced a trend of consolidation following the end of the Space Race and more significantly since the end of the Cold War. National interests have mostly prevented global consolidation; however, space suppliers are increasingly targeting foreign markets. Much of the space industry supply chain is dominated by large aerospace manufacturers. Yet an ecosystem of second and third tier suppliers exists with a fair amount of diversity and competition.

The emerging CCT companies can mitigate the power of suppliers by vertically integrating a supplier’s capability into the CCT provider or relying on foreign firms. The following paragraphs discuss the conditions in which suppliers are most powerful. Strategy is discussed separately given that similar strategies can be used to mitigate the effects of supplier power.

Analysis and Strategy

Concentration of suppliers is a medium level of concern. If suppliers are more concentrated than the industry it sells to, then they have more power according to Porter. In the emerging CCT industry some subcomponent
suppliers may be more concentrated. However, CCT companies may also be able to leverage many of the suppliers that currently serve the more broad space industry.

Suppliers’ not depending heavily on the industry is a medium level of concern. Some space industry suppliers are diversified into other industries but many space components are unique and only useful in the CCT industry.

Switching costs in the CCT industry are high due to the need to have tested, reliable components composing a space transport system. When switching costs are high, industry participants find it hard to play suppliers off against one another, according to Porter.

Supplier product differentiation has a medium level of impact. If suppliers offer products that are differentiated then a supplier group is powerful according to Porter. While most complex products have a unique differentiator, often protected through patenting, the space industry also leverages tested and often well understood technology.

If there is no substitute for what the supplier group provides, according to Porter, then suppliers are powerful. An example would be an astronaut union or some very unique component. Neither exists in the space industry therefore the supplier power effect for a substitute is low.

If the supplier group can credibly threaten to integrate forward into the industry the suppliers are powerful according to Porter. In the CCT industry vehicles are being constructed that depend on suppliers who may be able to credibly forward integrate. An example would be a capsule operator using a competitor’s launch vehicle for transport into orbit. Therefore supplier power due to the ability to forward integrate is high in this segment.

Overall the power of suppliers is medium. Countering CCT subcomponent suppliers’ various sources of power can be achieved through the same set of basic strategies. Mainly, CCT companies can establish long-term contracts with suppliers, attempting to leverage better pricing terms at the expense of flexibility. The strongest strategy may be to vertically integrate supplier’s capabilities into a CCT company whether through purchase of the supplier or creation of a new business unit. Finally, it may be possible to seek out alternative suppliers in foreign countries or in the aerospace industry.

A summary of these results are given in Table 1 below.

C. Force 3: Bargaining Power of Buyers

Powerful customers are the flipside to powerful suppliers, according to Porter, and can capture more value by forcing down prices, demanding better quality or more service (thereby driving up costs), and generally playing industry participants off against one another, all at the expense of industry profitability. Buyers have more power over suppliers if there is negotiating leverage relative to industry participants, especially if they are price sensitive, using their clout primarily to pressure price reductions.

The CCT industry has three tiers of buyers including sovereign clients with strong purchasing power, private companies that may operate space stations that require transportation for crews, and private citizens who may travel into space to for business or recreational purposes. Buyer power is rated as medium for the CCT industry. The majority of buyer power is centralized with sovereign clients and while these clients individually wield very strong influence over national suppliers, the global nature of the CCT industry allows for suppliers to draw upon a larger pool of buyers. CCT providers with service cost structures capable of serving sovereign clients, private companies, and space tourists will have the largest potential market to draw upon and will be impacted least by buyer power.

Analysis and Strategy

Buyer concentration and therefore power can be rated as medium. If there are few buyers, or each one purchases in volumes that are large relative to the size of a single vendor then buyers have increased power, according to Porter. Buyer power can be mitigated by the CCT industry be creating systems that appeal to the broadest cross section of the market, including sovereign clients throughout the globe, private firms aiming to operate space stations, and space tourists wanting to experience the environment of space.
If an industry’s products are standardized or undifferentiated, then buyers have more power, according to Porter. In the CCT industry there is a relatively high amount of differentiation at the technical level but less so at the functional level therefore buyer power is medium. Strategically, companies can reduce the effect of standardized products by creating and marketing differentiators. Such differentiators could include cost, safety capabilities, training and ground infrastructure.

Buyer power related to switching costs is relatively low in the CCT industry. If buyers face few switching costs in changing vendors then buyer power is high according to Porter. The CCT industry has minimal switching costs since vehicle interfaces are standardized and cargo interfaces, such as people, are standardized by their nature. Switching costs will increase if buyers place specialized requirements on CCT operators that require significant modification of a transportation system. Strategically, CCT operators could attempt to increase switching costs by utilizing unique standards or capabilities that a buyer becomes dependent on and which would have a high cost to stop using.

If buyers can credibly threaten to integrate backward and produce the industry’s product themselves then buyer power is strong, according to Porter. In the CCT industry, buyer power is high for this segment as sovereign buyers can credibly threaten to integrate backward. With time and money, sovereign clients could create their own launch systems for crew. Strategically, CCT suppliers could mitigate this threat by performing well and meeting terms of contracts. Delays in commercial services or accidents could cause clients to backward integrate.

If a buyer group is price sensitive it is then more powerful, according to Porter. Price sensitivity can be determined by the following characteristics:

- The product the buyer purchases from the industry represents a significant fraction of its cost structure or procurement budget.
- Buyer earns low profits, is strapped for cash or is otherwise under pressure to trim its purchasing costs.
- The quality of buyer’s product or services is little affected by the supplier’s product.
- The industry’s product has little effect on the buyers other costs

In the CCT industry the product does not represent a large portion of the buyers budget nor are most buyers strapped for cash with the exception of private companies seeking CCT services. The quality of a buyers product may have a significant effect on the industry’s product if for example a sovereign client places special requirements on a CCT provider. The CCT industry’s service has little effect on the buyers other costs. Overall, price sensitivity is low with sovereign clients, the largest buyers of CCT, therefore this segment is rated low. Strategically, CCT operators can mitigate buyer power by seeking out the industries least price sensitive buyers, sovereign clients.

A summary of these results are given in Table 1 below.

**Force 4: Pressure from Substitute Products**

The threat of substitutes describes the possibility that the CCT industry’s product may be supplied by different means according to Porter. Substitutes are always present but they may appear to be very different from the industry’s product. When the threat of a substitute is high, industry profitability suffers and a ceiling is placed on prices.

Threat of substitutes is high for the CCT industry, as with buyer power, the option exists for sovereign clients to shift policy towards self-operated transportation services if the savings or performance of the CCT industry falls below expectations. Government operated vehicles would cannibalize demand from that country and potentially some demand from other aligned countries, but would likely not cannibalize commercial demand from sources such as space tourism. Other threats exist from robotic systems that can perform tasks in lieu of human presence in space and new methods of simulating long-term microgravity for scientific research purposes on Earth. CCT operators must counter these forces by meeting promised performance objectives, investing in capability improvements, and stimulating the markets for which its future buyers will originate.
Analysis and Strategy

The threat of substitute is high if it offers an attractive price performance trade-off to the industry’s product and the buyers cost of switching to the substitute is low. The greatest substitute threat to the CCT industries are government operated systems. If cost or quality objectives are not met by CCT operators then they leave themselves open to a change of policy shift towards government operated space systems, for that share of CCT demand generated by that nation. Second, the need to have humans in space for research of any kind, except the study of humans working in space, can arguably be completed through telepresence and robotics. These technologies have advanced greatly in the last decade and may relieve some of the need to send people in space. Third, new methods of simulating effects of long-term exposure to microgravity may reduce the need for conducting research and development in space.

Strategically, CCT operators should work with buyers to stimulate development of new markets for their services. Such assistance might involve support for private space station developers and promotion and seed funding for new lines of research that will result in a need for CCT services. The CCT industry also must advocate the virtues of its service and value to its customers versus alternatives while investing strongly in incremental and disruptive improvements to its own service.

D. Force 5: Rivalry Amongst Existing Competitors

While the previous four forces describe external threat influencing the dynamics of the industry, traditional rivalry among competitors takes many familiar forms according to Porter. For example price discounting, new product introductions, advertising campaigns, and service improvements. Intensity of rivalry is high within the CCT industry. A relatively large number of competitors, high exit barriers, goals other than profitability, similar basic service, and moderate marginal costs all contribute to the creation of strong competition in this emerging industry. Competition on price will be strong leading to decreased industry profits. Strategically, competitors can standout by dealing well with the four external forces and finding methods to aggressively cut price while changing the basis of competition through product differentiation.

Analysis and Strategy

The intensity of rivalry amongst competitors is greatest, according to Porter, if the following conditions are present.

If competitors are numerous or are roughly equal in size and power then the intensity of rivalry is high. The emerging CCT industry has a range of competitors represented by companies of varying sizes. Historically, only a few human spaceflight operators have existed. Comparatively, there is a large number of emerging CCT operators resulting in a medium level of competition.

When exit barriers are high industry rivalry will be intense. The high capital requirements of specialized hardware used in the CCT industry may cause providers to avoid exiting the market for as long as possible. This dynamic may drag down industry profitability. Exit barriers lead to a high level of rivalry.

Rivalry will be intense if rivals are highly committed to the business and have aspirations for leadership, especially if those goals go beyond economic performance. The CCT industry has a handful of companies with leaders that are independently wealthy and who may view development of a CCT system as the first step in a private space exploration program. These organizations may be willing to fund CCT systems that experience negative profitability in order to have the system capability available for other uses. This factor is of high concern in the CCT industry.

According to Porter, the basis of competition is also important to understanding the intensity of rivalry. Price competition will occur if the product or services of rivals are nearly identical and there are few switching costs for

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5 Government operated systems are considered substitutes an not new entrant or existing competition in this paper because this entry does not compete in the same commercial market and does not expand the capacity of the privately operated systems.
buyers. The basic service of transporting humans safely into low Earth orbit may indeed represent a service that is homogenous at its core. Similar services are a high concern in the CCT industry.

When fixed costs are high and marginal costs are low intense rivalry can exist. According to Porter’s examples, this situation would most likely exist in a commoditized industry such as aluminum. While the CCT industry does require a large fixed investment and every extra launch helps amortize that expense, the marginal costs are relatively high and therefore this factor results in low intensity of rivalry.

Strategically, companies must be prepared to compete on price while changing the basis of competition by offer a unique service. Dealing well with the four other external forces will also give a CCT company an advantage over rivals.

A summary of these results are given in Table 1 below.

E. Summary

Below is a summary of the strengths of the five forces and sub-forces discussed along with examples of strategies CCT operators may use to improve competitive position.

<table>
<thead>
<tr>
<th>Forces</th>
<th>Impact on competition</th>
<th>Strategy for improving competitive position</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Threat of a new entrant</td>
<td>Low</td>
<td>The barriers are low, so the threat of new entrants is high.</td>
</tr>
<tr>
<td>1a. Supply-side economy of scale</td>
<td>Med</td>
<td>Consolidate market share, leverage adjacent markets</td>
</tr>
<tr>
<td>1b. Demand-side economy of scale</td>
<td>Low</td>
<td>Incentivize loyalty and offer a unique product or services</td>
</tr>
<tr>
<td>1c. Customer switching costs</td>
<td>Low</td>
<td>Incorporate proprietary standards</td>
</tr>
<tr>
<td>1d. Capital requirements</td>
<td>High</td>
<td>Incumbents may make financing difficult to obtain for new entrants. New entrants can self-finance</td>
</tr>
<tr>
<td>1e. Incumbency advantages independent of size</td>
<td>Med</td>
<td>Incumbents can solidify advantages; new entrants can highlight underperformance of incumbents</td>
</tr>
<tr>
<td>1f. Unequal access to distribution channels</td>
<td>Low</td>
<td>Obtain sole source agreements or if locked out attempt direct sales</td>
</tr>
<tr>
<td>1g. Restrictive government policy</td>
<td>Med</td>
<td>Lobby for advantage</td>
</tr>
<tr>
<td>2. Power of suppliers</td>
<td>Med</td>
<td></td>
</tr>
<tr>
<td>2a. Suppliers concentrated</td>
<td>Med</td>
<td></td>
</tr>
<tr>
<td>2b. Suppliers diversified</td>
<td>Med</td>
<td>Establish long-term contracts with suppliers, vertically integrate through purchase of suppliers or new business unit creation, use foreign suppliers.</td>
</tr>
<tr>
<td>2c. High supplier switching costs</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>2d. Supplier differentiation</td>
<td>Med</td>
<td></td>
</tr>
<tr>
<td>2e. No substitute</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>2f. Supplier can forward integrate</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>3. Power of the buyers</td>
<td>Med</td>
<td></td>
</tr>
<tr>
<td>3.1 Buyer concentration</td>
<td>Med</td>
<td>Design and market to broadest cross-section of buyers</td>
</tr>
<tr>
<td>3.2 Standardized products</td>
<td>Med</td>
<td>Design and market unique features</td>
</tr>
<tr>
<td>3.3 Switching costs</td>
<td>Low</td>
<td>Create unique capabilities that buyer becomes dependent on</td>
</tr>
<tr>
<td>3.4 Buyers backward integrate</td>
<td>High</td>
<td>Perform well, avoid delays and accidents</td>
</tr>
</tbody>
</table>
### Table 1. Analysis and Strategy. A five forces impact analysis and strategy for improving competitive position.

<table>
<thead>
<tr>
<th>Forces</th>
<th>Impact on competition</th>
<th>Strategy for improving competitive position</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5 Buyer price sensitivity</td>
<td>Low</td>
<td>Target least price sensitive buyers such as sovereign nations</td>
</tr>
<tr>
<td><strong>4. Threat of substitute products</strong></td>
<td>High</td>
<td>Perform on schedule and budget, invest in improvements, stimulate new markets for services</td>
</tr>
<tr>
<td><strong>5. Rivalry among competitors</strong></td>
<td>High</td>
<td>Differentiate an offers service to change the basis of competition away from price</td>
</tr>
<tr>
<td>5.1 Numerous competitors</td>
<td>Med</td>
<td></td>
</tr>
<tr>
<td>5.2 Exit barriers</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>5.3 Goals other than profitability</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>5.4 Similar products</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>5.5 Low marginal costs</td>
<td>Med</td>
<td></td>
</tr>
</tbody>
</table>

**IV. Conclusions**

Competition in the emerging CCT industry is strong and therefore profitability will likely be weak, unless firms change the basis of competition from price to unique non-price differentiated products and services. Based on Porter’s insights, competing to be the best will ultimately lead to price competition which will decrease the overall profitability of the industry. For a firm to increase its profitability in the emerging CCT industry, Porter advocates use of distinctive strategic positioning, or in other words, competing to be unique. To create and hold a unique position it is necessary for the CCT industry to create a business strategy that positions the company to best cope with the current competitive forces, anticipates and exploits industry change and the resulting shifts in the forces; and shapes the balance of forces to create a new industry structure that is more favorable to the company.

The analysis completed in this paper identifies the following strategies ranked in order based on impact to competition that can help shape a CCT operator’s strategy:

- Establish long-term contracts with suppliers, vertically integrate through purchase of suppliers or new business unit creation, use foreign suppliers
- Perform on schedule and budget, invest in improvements, and stimulate new markets for services
- Differentiate a service to change the basis of competition away from price
- Consolidate market share, leverage adjacent markets
- Incumbents can solidify advantages; new entrants can highlight underperformance of incumbents
- Lobby for advantage
- Design and market to broadest cross-section of buyers
- Design and market unique features
- Incentivize loyalty and offer a unique product or services
- Incorporate proprietary standards
- Obtain sole source agreements with buyer or if locked out of sales channels, use direct sales
- Target least price sensitive buyers such as sovereign nations

**Critique**

Michael Porter’s five forces analysis is a mature, peer-reviewed analytical framework normally used for understanding dynamics of mature industries. However, CCT is an emerging market. Applying this framework to the emerging CCT industry may not be optimal given the large uncertainties that exist for the industries future. Furthermore, the strong influence of government policy on the emerging CCT industry may mean that strategies used in mature industries to create the optimal competitive position may be less effective.

**Future Work**

Future updates to a commercial crew industry analysis could include reader suggestions for new or alternate strategies for attaining optimal position. Also, it may be possible to track quantitative metrics that could be used to
identify emerging trends in the industry. Finally, updating the analysis routinely may provide interesting insights into the changing structure of the CCT industry and the resulting strategic positioning opportunities.

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