Group Coursework Submission Form

Specialist Masters Programme

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MSc in: Business Analytics/Management	
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Lecturer: Elizabeth Stephens	**Submission Date: 19 July 2023**

Declaration:

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Q1. What is the most likely geopolitical risk scenario for the semiconductor sector and justify your decision.

This analysis examines six primary risk scenarios: trade war dynamics, national security concerns, supply chain reshuffling, technological competition, economic and financial impact, and changes in investment pattern. Each of these scenarios poses distinct challenges that have the potential to affect TSMC and the semiconductor industry significantly.

Trade War Dynamics

Trade tensions between major global powers, particularly the United States and China, have been escalating in recent years, leading to the imposition of tariffs, export controls, and sanctions (China Briefing Team, 2023). These trade wars have created significant risks for TSMC and the semiconductor sector. The disruptions in the global supply chain and limited market access resulting from these dynamics can severely impact TSMC's operations. Restrictions on the export of critical technologies and equipment hinder TSMC's ability to serve its customers and impede its global competitiveness. Moreover, the uncertainty and market volatility caused by trade tensions can reduce consumer confidence, leading to a decline in the demand for consumer electronics and semiconductor products (Cerutti, et al., 2021). As a result, TSMC's revenue and growth prospects could suffer, which would lead to a decline in orders and a drop in utilization rates. The ongoing trade disputes have created an environment of instability and unpredictability, making it challenging for TSMC and other semiconductor companies to plan and make strategic business decisions. The uncertainty surrounding trade policies, export controls, and potential retaliatory measures can disrupt long-term investment plans and partnerships. Furthermore, the broader economic implications of trade war dynamics, such as disruptions in global supply chains, increased costs, and reduced trade volumes, can have a significant impact on the overall semiconductor market and economic growth. As a leading player in the semiconductor industry, TSMC is particularly susceptible to these macroeconomic effects.

National Security

National security concerns within the semiconductor industry present a notable risk scenario for TSMC. Governments worldwide, particularly the United States, have increasingly implemented stricter regulations and export controls on semiconductor technologies deemed critical to national security (Dekker & Okano-Heijmans, 2020). These measures are designed to safeguard sensitive technologies from unauthorized use and malicious intent. However, for TSMC, these regulations can limit its ability to export advanced technologies to certain customers or countries, thus impacting the company's revenue and growth prospects. Additionally, national security concerns can result in restrictions on the use of specific semiconductor components or technologies in critical infrastructure, defense applications, or emerging technologies (Lieberman,2003). Consequently, TSMC's supply chain could be disrupted, necessitating adjustments to its manufacturing processes or product offerings to comply with these regulations.

Supply Chain Reshuffling

Geopolitical tensions present a significant risk scenario for TSMC and the semiconductor industry in the form of supply chain reshuffling. This risk arises from the ongoing efforts of governments and industry stakeholders to reduce dependence on certain countries and bolster domestic semiconductor capabilities. The implications of such reshuffling warrant careful consideration. Geopolitical tensions drive governments to prioritize the development of their domestic semiconductor industries and advocate for the reshoring of manufacturing capabilities. This is evident in the recent passing of the ‘CHIPS and Science Act’ in the US in 2022 (Johnson, 2022). The objective is to decrease reliance on foreign suppliers and strengthen domestic supply chains. These localization initiatives can directly impact TSMC's business by potentially redirecting manufacturing demand to domestic foundries or

introducing heightened competition in markets traditionally dominated by TSMC. This shift in the competitive landscape poses challenges to TSMC's market position and revenue streams. Restrictions on cross-border trade, export controls, or trade sanctions can impede the availability and reliability of critical components and materials, thereby affecting TSMC's production capabilities and the stability of its supply chain.

Technological Competition

One risk scenario that warrants consideration for TSMC and the semiconductor industry is the intensifying technological competition among countries, particularly in emerging technologies such as artificial intelligence, 5G, and advanced computing (Congressional Research Service, 2020). This risk stems from the increasing global focus on innovation and the race to establish technological leadership. TSMC's success has been built upon its ability to maintain a competitive edge in advanced semiconductor technologies (Hille, 2021). Geopolitical tensions drive technological competition as governments prioritize domestic semiconductor industries, leading to increased competition for TSMC. This intensified competition poses challenges to TSMC's market position and increases the risk of intellectual property theft and unauthorized technology transfer. Illicit means to acquire advanced semiconductor technologies, such as cyberattacks and forced technology transfers, threaten TSMC's competitive advantage, market position, and revenue generation.

Economic and Financial Impacts:

Geopolitical tensions can have broader economic and financial impacts, such as currency fluctuations, changes in investment patterns, and shifts in global economic power. These factors can affect consumer demand, market stability, and investor confidence, potentially impacting TSMC's revenue, profitability, and access to capital.

Geopolitical tensions can trigger volatility in currency markets. Uncertainty surrounding trade policies, geopolitical conflicts, or economic sanctions can cause currencies to fluctuate in value. For TSMC, operating in a global market, these currency fluctuations can impact the company's financial performance. When reporting financial results, revenues collected in other currencies could be converted. When converted, TSMC's stated revenues can fall if the reporting currency becomes more valuable relative to other currencies. On the other hand, reported revenues can rise if the reporting currency declines. The competitiveness of the business, its pricing policies, and its overall financial status can all be affected by this.

Changes in Investment Patterns:

Capital flows and investment patterns can be impacted by geopolitical concerns. In geopolitical settings that are unpredictable, investors could become more cautious and risk-averse. They might move their investments out of tense areas or industries. This will affect TSMC's ability to get financing for growth, R&D, and technological breakthroughs. The company's capacity to finance innovation, which is essential for preserving competitiveness in the semiconductor industry, can be hampered by a decline in investment. Changes in investing behavior could have an impact on the market demand for semiconductors, which would influence TSMC's income streams.

Q2. Explain how TSMC should adapt its business model to anticipate and manage the risks created by the scenario you have identified.

As a way to manage such risks TSMC should adapt their business models as a way to handle the issues below by:

Trade War Dynamics

Geographic and Market Diversification:

By spreading its geographic reach and entering new markets or sectors, TSMC needs to lessen its dependency on a single market. By locating production and research facilities in countries less affected by trade war tensions, the company will be able to expand its clientele and lower the risks associated with trade conflicts.

Partnerships and Industry Alliances:

TSMC should establish global alliances to reduce market dependency and address challenges from trade wars. Active participation in industry alliances and cooperation with other organizations will promote a secure trading environment and mitigate the impact of trade wars.

Supply Chain Resilience and Regulatory Compliance:

To enhance supply chain resilience, TSMC should prioritize supplier diversification, redundancy of key resources, and proactive monitoring of trade control policy changes. These measures mitigate risks from trade restrictions and disruptions caused by trade wars (TSMC,2021). Adhering to important rules safeguards operations and enhances adaptability to changing market conditions.

National Security

Establish a Reliable Local Presence and Trusted Partner Ecosystem:

By creating a local manufacturing site or business in the US, TSMC should reduce worries about national security. This indicates a dedication to national security and reduces the dangers connected to international supply chains. Further lowering threats and boosting trust among US stakeholders is the establishment of a trusted partner environment of US-based suppliers, contractors, and service providers.

Cooperation with US Government Agencies and Regulatory Compliance:

The Department of Defense and the Department of Homeland Security are two US government departments that TSMC must actively work together with. Through their cooperation, regulatory authorities are kept in the loop and security standards are met. To proactively manage risks related to national security concerns, strict adherence to US regulatory regulations and national security norms is crucial (Homeland Security Risk Management Doctrine, 2011).

Security and Compliance Measures and Intellectual Property Protection:

TSMC must put in place strong security procedures and compliance programmes to meet national security issues. This involves adherence to export rules and laws, improved cybersecurity processes, and supply chain integrity checks. It is essential for TSMC to protect its intellectual property in the US, and the company must use strong IP protection techniques including patents, trade secrets, and cybersecurity standards.

Supply Chain Restructuring

Agile and Flexible Supply Chain and Risk Management:
Their goal is to maintain a flexible supply chain that can adapt to global shifts. This involves relocating manufacturing, procurement, and logistics to alternative suppliers or regions for operational continuity. The business assesses risks and develops contingency plans to minimize disruptions. This includes finding backup suppliers, establishing safety stock levels, and implementing alternative logistical routes.

Diversified Supplier Base and Supplier Relationship Management:
Working with multiple vendors in different locations helps TSMC diversify its supply chain and reduce dependence on a single source, specifically Taiwan. This strategy mitigates the impact of supply chain disruptions caused by downsizing or geopolitical events (Sevilla, 2023). TSMC actively maintains strong supplier relationships through open communication, performance tracking, and collaborative risk management for reliable partnerships.

Improved Supply Chain Visibility and Continuous Improvement:
TSMC invests in real-time supply chain monitoring systems using advanced analytics, IoT, and blockchain. They prioritize continuous improvement by implementing lean practices, streamlining inventory management, leveraging digital technologies for agility, reducing lead times, and optimizing resource utilization.

Technological competition

Technical Leadership and Continuous Innovation:
TSMC places a high priority on sustaining technical leadership by making R&D investments. Because of its dedication to innovation and pushing the limits of semiconductor manufacturing technology, TSMC is able to outperform its rivals and provide cutting-edge solutions.

Customization and Customer-Centric Approach:
By giving customizable choices and providing tailored solutions that address its clients' unique demands, TSMC adopts a customer-centric philosophy. TSMC can set itself apart from rivals and forge closer bonds with customers by recognizing and accommodating client preferences.

Protection of Intellectual Property and Talent Acquisition and Development:
For TSMC to keep its competitive edge, comprehensive intellectual property protection, including patents, trademarks have been placed (Nystedt,2002). Additionally, by employing acquisition tactics and training programmes, TSMC is able to draw in and keep top industry personnel, giving it the experience it needs to compete in the quickly changing technology world.

Economic and Financial Impact

Currency Risk Management and Diversification of Funding Sources:
To lessen the effects of currency changes, TSMC should adopt strong currency risk management procedures and broaden its funding sources. This entails utilizing financial tools, such as hedging techniques, and investigating funding opportunities in various currencies or capital markets across many geographies.

Enhanced Financial Planning and Analysis and Robust Risk Management:
Enhancing capacity for financial planning and scenario planning, aids TSMC in foreseeing and assessing the possible effects of geopolitical conflicts (TSMC,2023). Additionally, they

are able to identify and minimize any interruptions by putting in place a strong risk management structure that takes geopolitical concerns into account.

Continuous Monitoring of Trade Policies and Regulations:
In order to be proactive in addressing any effects, TSMC should continuously monitor developments in trade rules and regulations. It is easier for them to negotiate uncertainty and make adjustments to its operations and supply chain by staying updated about export controls, trade restrictions, and other regulatory changes.

Changes in Investment patterns

Strengthen Investor Relations and Focus on Long-term Value Creation:
TSMC has to aggressively interact with investors, keep lines of communication open, and highlight its long-term value. Even in unstable geopolitical settings, the corporation allay investor fears by building confidence and showcasing resilience.

Diversification of Funding Sources and Strategic Market Diversification:
By entering new markets, TSMC can diversify its clientele and look for alternate funding options. This helps to lessen the effect of shifting investment patterns while reducing dependency on outside investments and ensuring availability to cash for growth and innovation (Sevilla, 2023).

Collaborative Innovation Initiatives and Continuous Monitoring:
TSMC can participate in joint innovation projects, drawing on a wider range of resources. The organization can foresee changes in investment patterns and modify its business strategy in response by tracking global investment trends, geopolitical developments, and market dynamics.

Word Count: 2030 words

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