

# Assignment Brief and Front Sheet PGT

This front sheet for assignments is designed to contain the brief, the submission instructions, and the actual student submission for any WMG assignment. As a result the sheet is completed by several people over time, and is therefore split up into sections explaining who completes what information and when. Yellow highlighted text indicates examples or further explanation of what is requested, and the highlight and instructions should be removed as you populate 'your' section.

This sheet is only to be used for components of assessment worth more than 3 CATS (e.g. for a 15 credit module, weighted more than 20%; or for a 10 credit module, weighted more than 30%).

## To be completed by the student(s) prior to final submission:

Your actual submission should be written at the end of this cover sheet file, or attached with the cover sheet at the front if drafted in a separate file, program or application.

Student ID or IDs for group work	5569029
----------------------------------	---------

## To be completed (highlighted parts only) by the programme administration after approval and prior to issuing of the assessment; to be consulted by the student(s) so that you know how and when to submit:

Date set	18/10/2024
Submission date (excluding extensions)	11/11/2024 by 12 p.m. UK time
Submission guidance	Tabula link
Marks return date (excluding extensions)	09/12/2024
Late submission policy	<p>If work is submitted late, penalties will be applied at the rate of <b>5 marks per University working day</b> after the due date, up to a <b>maximum of 10 working days</b> late. After this period the mark for the work will be reduced to 0 (which is the maximum penalty). "Late" means <b>after the submission deadline time as well as the date</b> – work submitted after the given time even on the same day is counted as 1 day late.</p> <p>For <b>Postgraduate</b> students only, who started their <b>current course before 1 August 2019</b>, the daily penalty is <b>3 marks</b> rather than 5.</p>
Resit policy	<p>If you fail this module and/or component, the University allows students to remedy failure (within certain limits). Decisions to authorise resits are made by Exam Boards. These will be issued at specific times of the year, depending on your programme of study. More information can be found from your programme office if you are concerned.</p> <p>If this is <b>already a resit</b> attempt, this means you will not be eligible for an additional attempt. The University allows as standard a maximum of two attempts on any assessment (i.e. only one resit). Students can only have a third attempt under exceptional circumstances via a Mitigating Circumstances Panel decision.</p>

To be completed by the module leader/tutor prior to approval and issuing of the assessment; to be consulted by the student(s) so that you understand the assignment brief, its context within the module, and any specific criteria and advice from the tutor:

<b>Module title &amp; code</b>	WM9E8-15 Strategy and Finance for Engineering Organisations
<b>Module leader</b>	Mairi Macintyre
<b>Module tutor</b>	Mairi Macintyre
<b>Assessment type</b>	Essay
<b>Weighting of mark</b>	70%

<b>Assignment brief</b>	
<p>Identify an engineering organisation that you admire.</p> <p>Using techniques delivered during the module, research the organisation and scope the strategic context the organisation operates within. Analyse the current strategic operating environment. (LO1, LO4)</p> <p>Using material presented in the module, discuss how this organisation can strategically leverage its capabilities and competitive positioning to achieve sustainable long-term advantage in a dynamic business environment? (LO1, LO4)</p> <p>Suggest tools and techniques the organisation might use to manage strategy implementation, measure performance, and drive development. (LO3, LO4)</p>	
<b>Word count</b>	2800 This excludes Tables, Figures etc. and References
<b>Module learning outcomes (numbered)</b>	<ol style="list-style-type: none"> <li>1. Critically evaluate key areas of strategic decisions, capabilities and competitive positioning of an organisation in order to improve, or sustain, long-term competitive advantage. (AHEP M2, M4, M5)</li> <li>2. Calculate and interpret the costs of production of goods, budgets and projections (AHEP M1, M2, M4)</li> <li>3. Critically apply and appraise the tools and techniques used to manage and measure the implementation and development of strategy and performance for an engineering organisation. (AHEP M2, M4)</li> <li>4. Assess real world strategy and performance for an engineering organisation issues through applying learned models, frameworks, methodologies and techniques. (AHEP M2, M4, M5)</li> <li>5. Reflect on how the module has developed your understanding of strategy creation, deployment and ongoing performance of an engineering business(AHEP M5).</li> </ol>

# Table of Contents

## List of Figures

<b>1. Introduction.....</b>	<b>5</b>
• Background.....	5
• Mission.....	5
• Aim.....	5
 <b>2. Situation Diagnosis</b>	
• SWOT Analysis.....	5
• PESTLEE Analysis.....	7
 <b>3. Strategy Creation Tools</b>	
• TOWS Analysis.....	9
• Strategic Options.....	11
• Strategy Statements.....	12
• Strategy Road mapping.....	12
 <b>4. Strategy Deployment</b>	
• Force Field Analysis .....	13
• Stakeholder Mapping.....	14
 <b>5. Conclusion.....</b>	<b>15</b>
 <b>6. List of References.....</b>	<b>16</b>

## **List of Tables**

- Table 1: SWOT Analysis for Toyota Automobile.....6
- Table 2: PESTLEE Analysis for Toyota Automobile.....8
- Table 3: TOWS for Toyota Automobile.....10
- Table 4: Strategic Options Table.....11

## **Abbreviations**

SWOT – Strength Weakness Opportunity Threat

PESTLEE – Political, Economic, Social, Technological, Legal, Environmental, Ethical

TOWS – Threat, Opportunity, Weakness, Strength

R&D – Research and Development

EVs – Electric Vehicles

TPS – Toyota Production System

UK – United Kingdom

\$ - United States Currency (Dollar)

IC – Internal Combustion

## **Introduction**

Toyota, a global leader in the automotive industry, is renowned for its innovation, reliability, and commitment to sustainability. Founded in 1937 by Kiichiro Toyoda in the Japanese city of Toyota, where the company is still headquartered. Toyota operates primarily in the automotive, finance, and information technology sectors. Toyota Automobiles is aiming to achieve carbon neutrality by 2050 (Corporation 2021). With the mission of “Producing Happiness for All” {CORPORATION, 2024 #31} by contributing sustainable and eco-friendly development for society and planet, Toyota motors looking forward to be carbon neutral by 2050.

In this analysis, I will apply the strategies learnt in class to explore Toyota’s sustainability efforts and outline its roadmap toward achieving carbon neutrality. A SWOT analysis will be conducted to assess Toyota's internal strengths and weaknesses, followed by a PESTLEE analysis to evaluate external market conditions. Next, a TOWS analysis will help identify opportunities and threats, leading to the development of strategic options. By integrating these strategies, a comprehensive roadmap will be developed to guide Toyota toward its goal of achieving carbon neutrality and to implement the strategies, Force Field Analysis and Stakeholder Mapping will be done.

### **SWOT Analysis –**

SWOT (Strength, Weakness, Opportunity, Threats) is one of the oldest and most widely used strategy tool. “SWOT Analysis is a simple but powerful tool for sizing up an organization’s resource capabilities and deficiencies, its market opportunities, and the external threats to its future” (Firananda 2019).

In the table given below, a detailed SWOT analysis has been done in order to understand the strengths, weaknesses, opportunities and threats of Toyota Automobile which shows detailed view of its internal and external factors which can play a major role to accelerate/slower Toyota Automobiles pace towards carbon neutrality. Toyota’s strengths include heavy investments in R&D (Toyota Global) with more than half of their investment for research and development are focused on the development and a big push towards EVs by 2030(HALL, 2023). Also, Toyota’s lean and efficient Production System supports its strong global market position (Muhammed Zakir Hossain 2017). Being a leader in hybrid technology, Toyota introduced its first mass-produced hybrid in the world. To complement all those strengths, Toyota also has a wide network of suppliers and logistic partners across the globe (Supplier Relations, Toyota UK) which will help Toyota implement its carbon neutrality goal by 2050.

However, there are few weaknesses for Toyota, like high rate of recalls (Insight Partners,2023) slower progress in fully electric vehicles and Autonomous vehicles (Toyota Motor, Matthew Ramirez, May 2024). On other hand, there are areas where Toyota can improve itself, like expanding into emerging market and boosting the EVs effort in market like India and China. Also, Toyota can enter in the fully Autonomous Car market as well. But it also faces threats from competitors since the EV race has now become more crowded, also Toyota has really slow progress in terms of fully electric vehicles. Criticism for increased greenhouse gas emission is one of the biggest threats to Toyota Automobile (ESG Dive, Zoya Mirza, Dec. 2023). Those were some of the key areas where Toyota can improve itself and proceed further to be carbon neutral.

<p><b>STRENGTHS</b></p> <ol style="list-style-type: none"> <li><b>1. Strong R&amp;D Focus and Capital Investment-</b> More than 50% of R&amp;D staff and Half of their R&amp;D expenses have been shifted to Advanced Development Field. (Toyota Global). Also, Toyota is increasing investment in Electric Vehicles by \$7.34 billion by 2030 (Hall 2023).</li> <li><b>2. Toyota Production System</b> - TPS is an original philosophy by Toyota which mainly focuses on eliminate waste and to get the best possible efficiency. Toyota call it “Lean” or “Just-In-Time” (Europe 2024)</li> <li><b>3. Global Dominance</b> – Toyota was at the top of the list (2023) of World’s Largest Car Brands with dominating the market share 10.7% (Carlier 2024).</li> <li><b>4. Tri-gen Renewable energy System</b> – Tri-gen a technology by Toyota which generates 100% Renewable energy. It converts renewable biogas into electricity, hydrogen and water (Sapp 2024)</li> <li><b>5. Hybrids</b> – Toyota was the first automobile manufacturer who mass produced world’s first hybrid vehicle “Prius” back in 1997(Toyota UK Magazine, Joe Clifford, Feb 2015).</li> <li><b>6. Wide Network of Suppliers, dealers and Logistic Providers</b> – Toyota has 800+ suppliers’ network alone in UK for 260 parts to manufacture (UK).</li> </ol>	<p><b>WEAKNESSES</b></p> <ol style="list-style-type: none"> <li><b>1. Manufacturing Defects</b> - Toyota has high vehicle recall rate which certainly affects the reputation of the company. 3533 cars had been recalled in FY2022 which had some defects (Takim 2015)</li> <li><b>2. Lacking in Autonomous Vehicle Technology</b> – In terms of Autonomous Vehicles Toyota is behind its rivals including General Motors, Ford and Tesla. Ford and GM were testing their Autonomous cars back in 2013 (Jurevicius 2023).</li> <li><b>3. Slow Adaption to electric vehicles</b> – Although Toyota leads Hybrid technology, still Toyota is behind its competitors when it comes to Electric Vehicles (Ramirez 2023).</li> <li><b>4. Dependency on Certain market</b> – Toyota is heavily dependent on International Market which is full of ups and downs. International market is unpredictable in terms of social factors, political factors, currency exchange rate., environmental diversity (Toyota SWOT Analysis, Daniel Pereira, June 2023).</li> </ol>
--	--

OPPORTUNITES	THREATS
<ul style="list-style-type: none"> <li>• <b>Expansion in Emerging Market</b> – Toyota can expand its presence in South Asia, Brazil and China as most of the countries are switching to EVs (Ramirez 2024).</li> <li>• <b>Growing demand of electric vehicles</b> – Toyota can improve its investment in Electric Vehicles. Country like India where government offers financial assistance on EVs and market is expected to grow up to 94 % from 2021-2030 (Miller 2022).</li> <li>• <b>Autonomous Driving Technology</b> – Entering into autonomous driving technology could open new success doors for Toyota (Ramirez 2024).</li> <li>• <b>Partnership and alliance</b> – Partnering with technology companies and other vehicle manufacturers can open doors for Toyota in terms of EVs, Autonomous Vehicle.</li> <li>• <b>Support from Government</b> – The Government of UK Providing financial support to Toyotas project of developing a fuel cell powered Hilux. Also, Toyota will receive funding from Government of UK to develop hydrogen technologies (Toyota UK).</li> </ul>	<ol style="list-style-type: none"> <li>1. <b>Tough Competition</b> – Entire automotive industry is in rush to achieve the carbon neutrality at their earliest, like GM, VW, Ford and TESLA. Also, there's a threat from new entrants as well (Nkomo)</li> <li>2. <b>Slow Transition to full electric Vehicles</b> – Toyota has been criticized for being slower than its rival to switch to fully electric vehicles (Pacific 2022).</li> <li>3. <b>Dependency on Hybrid Vehicles</b> – Toyota is only focusing on Hybrid and Internal Combustion engines and is a global roadblock to electric vehicles. (Costello 2022).</li> <li>4. <b>Economic Uncertainty</b> – Ups and Downs in currency exchange rate and trade policies can affect Toyotas goal. (Ramirez 2024)</li> <li>5. <b>Poor Reputation for GHG</b> – Toyota Motors Greenhouse Gas emission increased in 2023 as compared to 2022. In 2022 emissions recorded were 618,729 metric tons, meanwhile they increased in 2023 to reach 626,347 metric tons (Mirza 2023).</li> <li>6. <b>Technological Disruption</b> – Toyota has already faced few technological disruptions. Whether it is from Covid Pandemic or technical glitch which happened in 2022 which made Toyota slip down by 0.5% in early trading (Attarwala 2023)</li> </ol>

**Table 1. SWOT Analysis**

## PESTLEE Analysis –

Table given below explains the PESTLEE analysis of Toyota Automobile and analyzes the external factors which play a vital role in the process of achieving carbon neutrality of Toyota Automobile across the globe. Talking about the political side, since Toyota Automobile operates in more than 170+ countries, the regulations on emissions varies country to country (Authority). Also, Government of UK is providing financial support to Toyota to develop a fuel cell powered truck (Toyota UK). Economically, consumers income plays a vital role (Muehlegger and Rapson January 2021) since most EVs are owned by wealthy households. In order to sell more battery electric vehicles, Toyota will need to keep the prices competitive. Consumer preferences are unpredictable and can change in future. Although, Toyota has one of the loyal customers support but in last year Toyota was ranked in 7<sup>th</sup> position in Customer Loyalty (Katekebo 2023). Also, by using social media Toyota can create more positive impact and awareness about carbon neutrality. Technologically, advancements in battery life and its eco-friendly disposal is evolving and Toyota must cope up with that. Also, there's another door of fully autonomous vehicles which is open in market and currently ruled by Tesla, Toyota can collaborate with other tech companies to enter in that segment as well. Different legal requirements related to emissions and labor laws create compliance costs. Environmental concerns like sustainable sourcing (Lisa Ellram and Wendy Tate) and waste management plays an important role to achieve carbon neutrality. Since Toyota has Tri-gen technology, it can be used as renewable energy source for its operations. Lastly, Toyota's ethical practices in governance and transparency show its commitment to sustainability worldwide.

<b>Political</b>	<ul style="list-style-type: none"> <li>• <b>Government Regulation</b> – Government Regulations mainly on emissions and fuel efficiency may affect the production and sales of Toyota.</li> <li>• <b>Worldwide Political Stability</b> – Political instability can disrupt the supply operation and can affect the sales in global market</li> <li>• <b>Government Subsidies /Support</b> – The Government of UK Providing financial support to Toyotas project of developing a fuel cell powered Hilux. Also, Toyota will receive funding from Government of UK to develop hydrogen technologies (Toyota UK).</li> </ul>
<b>Economical</b>	<ul style="list-style-type: none"> <li>• <b>Economic Growth and Stability</b> – The Economic growth and stability of any particular region or country in the world significantly influences the economy of automobile industry.</li> <li>• <b>Consumer income</b> – Purchasing power and income level of consumers directly reflects the sales numbers. Higher income typically leads to increased sales or vice versa (Muehlegger and Rapson January 2021)</li> <li>• <b>Interest Rates</b> – Interest set by the respective banks affects cost of financing a vehicle. Lesser the interest rate more affordable cars will be. Whereas high interest rate can discourage buyers.</li> </ul>
<b>Social</b>	<ul style="list-style-type: none"> <li>• <b>Changing Consumer Preferences</b> – Consumer preferences are unpredictable and evolving continuously. There is a plethora of other options available in the market of EVs including Tesla, Ford and General Motors.</li> <li>• <b>Health and Environmental Awareness</b> – Health and Environmental awareness is continuously increasing. Also, consumers are becoming more conscious about emissions and preferring EVs and more fuel-efficient cars.</li> <li>• <b>Cultural influence</b> – Toyota is well known for its reputation all over the world. Also, social media and online reviews are becoming source of trust.</li> </ul>
<b>Technological</b>	<ul style="list-style-type: none"> <li>• <b>Advancements in Electric Vehicle Technology</b> – EVs are evolving rapidly, with this change, advancements like battery life, charging infrastructure is also evolving. All these updates are necessary in order to reduce the carbon footprint.</li> <li>• <b>Autonomous Driving and AI</b> – Self-Driving technology is perhaps the biggest automobile shift which has ever happened.</li> <li>• <b>Cybersecurity</b> – As vehicles are becoming more reliant on technology and Artificial intelligence, cybersecurity becomes a massive concern.</li> </ul>
<b>Legal</b>	<ul style="list-style-type: none"> <li>• <b>Emissions and Environmental Regulations</b> – Toyota operates in 170+ countries. To match the rules and regulations for every specific country.</li> <li>• <b>Safety Standers</b> – Safety Standards are set by the respective government which every manufacturer has to follow.</li> <li>• <b>Labor laws and regulations</b> – Labor laws and regulations affect the workforce management of every industry and Toyota is no exception to it. Also, since Toyota is a global brand, the wages, health safety standards are different across the globe.</li> </ul>



<b>Environmental</b>	<ul style="list-style-type: none"> <li>• <b>Climate Change</b> – Carbon dioxide is one of the most serious Environmental pollutants generated by cars. Plays a large role in climate change. Battery Electric Vehicles will surely help reduce the emissions.</li> <li>• <b>Energy Consumption</b> - The amount of energy used in manufacturing and how fuel-efficient vehicles are both important for the environment. Cutting down on energy use not only saves money but also reduces the environmental impact of making vehicles.</li> <li>• <b>Waste Management</b> - Properly managing waste like disposing of and recycling car parts and materials is essential for reducing environmental impact. The industry needs to consider a vehicle's full lifecycle from production all the way to disposal at the end.</li> <li>• <b>Sustainable Sourcing</b> - Ethical and sustainable sourcing of raw materials and parts is becoming more important for the car industry.</li> </ul>
<b>Ethical</b>	<ul style="list-style-type: none"> <li>• <b>Sustainable Practices</b> – Giving Sustainable practices lessons to employees in order to reduce unnecessary usage of energy and reducing the waste.</li> <li>• <b>Ethical Governance</b> – Maintaining transparency in business operations and upholding anti-corruption, strong governance policies.</li> <li>• <b>Ethical Marketing</b> – Promoting Renewable energy sources, highlighting eco-friendly efforts which help to reduce carbon footprints</li> </ul>

**Table 2. PESTLEE Analysis**

### **TOWS Analysis –**

TOWS analysis is a useful tool for linking a company's internal strengths and weaknesses with outside opportunities and threats to create effective strategies. Developed by Weihrich in 1982 as a step up from SWOT, TOWS guides companies in building strategies by connecting internal and external factors logically. The TOWS matrix sorts strategies into four types: Strength-Opportunity (SO), Strength-Threat (ST), Weakness-Opportunity (WO), and Weakness-Threat (WT), helping companies explore different approaches based on these combination(Gomatesh M. Ravanavar 2012).

**Strength and Opportunities** – Toyotas massive investment in R&D creates a great chance to enter the major markets with EVs, like India and China (S1, O1). As the demand of EVs in rapidly increasing, Toyota can make use of its wide and strong network of suppliers and dealers to expand its market presence for EVs (S6, O2). Additionally, Tri-gen Renewable technology could be a valuable tool for entering emerging markets and supporting sustainable growth (S4, O1).

**Strength and Threat** - Toyota's large supplier and dealer network helps reduce the threat of slow adaptation to EVs, as this network can speed up the transition (S6, T2). Also, Toyota's dominant global presence gives it a strong edge in competing with other automakers, allowing it to take advantage of its market dominance (S3, T1).

**Weakness and Opportunity** – Although, Toyota has been slower than its competitors in adapting EV technology, it has a big opportunity to benefit itself from the rising demand for EVs (W3, O2). By partnering with major tech companies and other manufacturers, Toyota could also enter the autonomous vehicle market which is currently ruled by Tesla (W2, O5). In addition to that, Toyota could gain government support if it chooses to increase its lineup of full EVs (W3, O6).

**Weakness and Threat** - To compete strongly in the growing market, Toyota should focus on improving any existing manufacturing issues to build a stronger reputation for reliability (W1, T1). Rather than relying mainly on hybrid technology, Toyota should consider transitioning to fully electric vehicles to stay competitive and meet changing customer expectations (W3, T3).

<p><b>Strength – Opportunity</b></p> <ul style="list-style-type: none"> <li>• Since Toyota has invested a plethora of capital in R&amp;D, which creates an opportunity to penetrate the major markets like India and China (S1, O1).</li> <li>• As the demand of EVs increasing, Toyota can take the advantage of its wide Suppliers and dealership network. (S6, O2)</li> <li>• Toyota can Integrate its Tri-gen Renewable technology which can be utilized in penetrating the emerging markets. (S4, O1)</li> </ul>	<p><b>Strength – Threat</b></p> <ul style="list-style-type: none"> <li>• Toyota has a broad network of suppliers and dealers, taking advantage of the same Toyota can lower the threat of slow transition to EVs. (S6, T2)</li> <li>• Toyota can take the advantage of its strength Global Dominance to compete with its rivals. (S3, T1)</li> </ul>
<p><b>Weakness – Opportunity</b></p> <ul style="list-style-type: none"> <li>• Although, Toyota is slower than its competitors when it comes to adaption of EVs, there's a big opportunity for Toyota as the demand of EVs is increasing. (W3, O2)</li> <li>• Toyota can penetrate the market of Autonomous Vehicles which is already being ruled by Tesla, if Toyota partners with big tech companies and other car manufacturers. (W2, O5)</li> <li>• Toyota can get financial support from the Government, If Toyota wishes to launch more fully electric vehicles in future. (W3, O6)</li> </ul>	<p><b>Weakness – Threat</b></p> <ul style="list-style-type: none"> <li>• Toyota should work on its manufacturing defects so that it will have a strong stand against its intense competition (W1, T1)</li> <li>• Instead of being rely on Hybrid vehicles only, Toyota must switch to fully Electric Vehicles (W3, T3)</li> </ul>

**Table - 3 TOWS**

**Strategic Options** – Based on the TOWS analysis, below are some strategic options that Toyota can pursue to achieve carbon neutrality by 2050. These options will help create a clear Road Map and Strategy Statements for Toyota. Additionally, an estimated budget has been created for these strategies to understand how much capital Toyota will require and how long it will take to implement them. To complete the challenge of achieving carbon neutrality by 2050 globally, Toyota currently invested 5 Trillion (approximately \$46 billion USD) till 2030. That can be calculated as \$5 billion USD each year(Global 2023). To achieve Carbon Neutrality Toyota has 26 years from this year and Toyota will spend around \$5 Billion a year.

Details	Cost of Implementation (Billions)	Time to Implement (Years)
1. <b>Expand in Emerging Markets with Strong R&amp;D Innovations</b> – By leveraging its massive investment in R&D, Toyota can accelerate its entry in major markets like India and china.	\$1-1.2	1-2
2. <b>Capitalize on EV Demand with wide network of Suppliers and Dealers</b> – To fulfill the rising demand of EVs worldwide, Toyota must take the advantage of its broad network of suppliers and dealers to widen its reach to the customers.	\$1	2-3
3. <b>Utilize Tri-gen Renewable Technology for Market Expansion</b> – Toyotas Tri-gen technology offers an innovative and environment friendly edge which can be used to penetrate various market areas.	\$1.5	6-7
4. <b>Accelerate EV development to stay competitive in market</b> – Toyota has only 1 fully electric vehicle in the market. To stay competitive in this transforming market where people are switching towards EVs, Toyota must accelerate its production by scaling the number of EV offerings.	\$1	1-2
5. <b>Collaborate with tech companies to enter in Autonomous Vehicle market</b> – By collaborating with current well-known tech companies, Toyota can also enter in the Autonomous Vehicle department which is currently ruled by Tesla.	\$2-3	7-8
6. <b>Accelerate transition from Hybrid and Plug in Hybrid vehicles to Fully Electric Vehicles</b> – Although, Toyota has a plethora of options available when it comes to Hybrid vehicles and its types, but that is not sufficient. Toyota must accelerate its production of EVs and launch new vehicles driven by battery only.	\$1	5-6
	TOTAL - \$ 8-9	

**Table 4 Strategic Options**

#### **Strategic Options -**

1. **Expand Emerging Market** – Toyota can use its strong R&D background to penetrate the high-growth market areas like China and India. This would take around \$1-1.2 Billion and a tentative time period of 1-2 years.
2. **Meeting EV Demand Using Strong Supplier and Dealer Network**– With the help of its wide network of suppliers and dealers Toyota can cope up with EV demand. For this strategy estimated cost would be around \$1 Billion.

3. **Expanding the usage areas of Tri-Gen Technology** – Tri-Gen Technology which is both innovative and ecofriendly can help penetrating in new market areas but since the technology is new It will take 6-8 years to reach the market places and also it requires a missive financial support of around \$1.5 billion.
4. **Speeding up EV Development** – Since Toyota has only one fully Electric Vehicle, the company needs to speed up with more EVs lineup. To achieve that Toyota needs to invest around \$1 Billion for infrastructure and supply operations
5. **Collaborating with Tech firms for Autonomous Driving Technology** – Around 7-8 years and an investment of 2-3 would be required for Toyota to Enter in Autonomous Driving category.
6. **Transitioning from Hybrid to Fully Electric Vehicles** – Although, Toyota offers many hybrid vehicle options still it needs to focus on Full EVs to align with industry needs. This move might cost a billion dollar and take 2-3 years.

**Strategy Statements** – From above mentioned Strategic Options, these are some strategic statements occurred. These statements will guide a strong way towards the goal of Carbon neutrality of Toyota.

1. **Accelerate EV development and Focus on penetrating major market areas.**
2. **Expanding the usage of Tri-gen Renewable Technology.**
3. **Sustainable Innovations Through Collaborative Partnerships.**

**Strategy Road Mapping** – To reach the carbon neutrality by 2050 with an annual budget of around \$8-9 billion, Here's a Toyotas Road map structured in way which focuses most impactful initiatives each year along with short, medium- and long-term goals. By combining the strategy options I've created Toyotas Road map in 3 Intervals of Goals.

- **Short Term Goals - Expansion in Electric Vehicles Lineup and Achieving Sustainable Supply Chain and (2024-2030)** – In this span of 6 years Toyota will expand its EVs line up and will work to achieve sustainable supply chain.
  1. **Accelerate EV Development (2024 to 2026)** – With the help of strong R&D background Toyota should launch more EV options since currently Toyota has only one fully electric vehicle.
  2. **Sustainable Supply Chain (2024-2030)** – As Toyota is currently operating in more than 170+ countries across the globe, it has a broad network of suppliers and dealers. Strengthening the supplier network to support Toyotas transition towards EVs and Investing in Renewable energy sources across the supply chain.
- **Medium Term Goal – Expanding Tri-Gen Technology and Entering Fully Autonomous Car Market (2031-2040)** – The next decade after 2030, Toyota will expand its Technological innovations like Tri-Gen Renewable Energy Technology and simultaneously entering the market of Autonomous Vehicles.
  1. **Entering into Fully Autonomous Car Market (2031-2034)** – Although, Toyota will have a line up EVs by the start of coming decade, still to fulfill the consumers demand and to keep itself in race of technology Toyota shoul partner up with some tech companies and other auto manufacturers to enter the fully Autonomous Vehicle market.
  2. **Installing Tri-Gen Technology System (2031-2040)** – Installing Tri-Gen Systems across the manufacturing plants of Toyota Motors which will lead to reduce the carbon emissions and also generate Hydrogen, and water using Renewable Energy sources only.
- **Long Term Goal – Scaling Up the Carbon Neutral Operations and Hydrogen vehicles (2041-2050)**
  1. Transitioning all the operations of Toyota Motors to work on 100% Renewable energy.
  2. Focusing on mass production of Hydrogen Powered Vehicles.

3. Optimizing Toyota Production System throughout the span of Carbon Neutrality process which will reduce the unwanted and excessive wastage of materials and sources.

Hence, from the above-mentioned roadmap Toyota can achieve carbon neutrality by 2050. In short term goals (2024-2030), Toyota will expand its EV lineup and build a sustainable, renewable energy-based supply chain using its strong research and development background and Toyota Production System to reduce waste. The medium term (2031-2040) focuses on adopting Tri-Gen Technology and entering the autonomous vehicle market through Partnerships. Finally, in the long-term Toyota aims to operate entirely on renewable energy and scale up hydrogen vehicle production by 2050.

**Force Field Analysis** – ‘Force Field Analysis’ was proposed by Kurt Lewin in 1951 to analyze general problem situations and to determine the course of action. A force field analysis begins by identifying all the factors which are driving towards or blocking the path to reach the goal of the company (Nicholas 1989). Force Field Analysis helps Toyota to reach its goal by identifying what factors are pushing towards the goal and what factors are restricting it.

#### **Forces Pushing Towards Carbon neutrality –**

1. **Market Demand for Sustainability** – Consumer preferences are shifting toward more environment friendly product, which acts as a driving force for Toyota to reach its goal.
2. **Technological Innovations** – Toyota is manufacturing compact electric drive unit named eAxe. It helps pack battery, gear train and motor in a compact space which reduces the weight of vehicle and increases its range (Site 2023).
3. **Government Regulations and Subsidiaries** – Since Environmental Regulations are becoming strict worldwide, Toyota needs to comply with them. Also, subsidiaries offered by different government pushes Toyota to move closer of its goal.
4. **Customer Loyalty** – Toyota has one of the most loyal customers base in auto industry. As most of the customers who already own a Toyota are waiting for Toyota to launch the EVs. That’s a major push towards the goal.
5. **Long Term Stability** – Toyota will achieve a long-term stability after reaching its goal at its earliest which is helping Toyota to push itself towards carbon neutrality.

#### **Forces Against Carbon neutrality –**

1. **Supply Chain Disruption** - Sourcing sustainable materials and ensuring that suppliers also meet net-zero standards can be challenging and may lead to disruptions.
2. **Bad Planning and Poor Strategies** – Any wrong move in planning and strategy can restrict the pace of Toyota towards carbon neutrality.
3. **Insufficient trained staff** – Insufficient trained staff may reduce the productivity and also lead to more waste. A lack of training may also affect employees’ understanding of the company’s goals.
4. **Consumer Demand Uncertainty** – Although, the demand of sustainable vehicles is increasing still market is unpredictable about future. Also, some of the customers are fond if IC engines, so they refuse to shift towards EVs.

**Stakeholder Mapping** –The process of stakeholder mapping involves identifying and evaluating the importance, influence or impact of different stakeholders in relation to a project decision (Ungureanu, Bragança et al.). By identifying and understanding, Toyota can better align its strategies, making the process more efficient and comprehensive. Here's how the stakeholder mapping can contribute to Toyota's goal of carbon neutrality.

1. **High Influence and High Interest** – The high influence and high interest includes the people who make a direct impact on project's success through decisions and resources. For Toyota, to achieve carbon neutrality the high influence and high interest key players will play a vital role.
  - **Toyota Management and Executives** - Responsible for setting priorities and approving funding for Toyota's carbon-neutral initiatives.
  - **Government and Regulatory Bodies** – Government laws mainly on environmental and safety side will have high influence and high interest to monitor emissions standards and sustainability laws that Toyota must follow.
  - **Research and Development and Manufacturing Teams** - Develop new EVs, Tri-Gen Technology, and autonomous cars, so they directly drive progress on Toyota's goals.
  - **Suppliers** – They will play a vital role in Toyota's goal of carbon neutrality since they'll have to adopt renewable energy operations and sustainability practices which aligns with Toyota's goal, hence they will highly influence and have high interest.
2. **High Influence and Low Interest** – These bodies will create high influence on Toyota's goal of carbon neutrality but they will have lesser interest. They have the power to influence public perception and policies but may not be deeply involved in the daily details of the project.
  - **Media** – Media plays major role in shaping public's opinion and support towards Toyota's carbon neutrality program.
  - **Local Government** - Impact Toyota's operations through local policies on renewable energy and emissions. Although, they highly influence Toyota towards carbon neutrality but on the same time they have less interest.
3. **Low influence and high Interest** – These bodies are interested in the program but have little control over a company's goal.
  - **Customers** – They are highly interested in sustainable products and their interest pushes Toyota towards carbon neutrality but their interest doesn't have high influence on the goal.
  - **Dealers** – Dealers need to stay updated on Toyota's EV and hydrogen vehicle lineup to adjust their sales and service. They highly interested to be on the same page of Toyota's carbon neutrality book but they have lesser influence.
4. **Low Influence and Low Interest** – These are people/bodies who have limited interest about Toyota's goals and also the barely influence Toyota to achieve carbon neutrality.
  - **General Public** - The general public usually includes consumers who are not directly involved with Toyota's business operations but may still be impacted by the company's environmental efforts. While their individual influence on the carbon neutrality program is limited.
  - **Police** – Local Police are not directly involved in Toyota's carbon neutrality program but they might get involved indirectly. For instance, they could help traffic management, safety or security during the construction of new facilities or big projects.

**Conclusion** – The analysis demonstrates Toyota’s efforts to achieve carbon neutrality by 2050. As a leader in hybrid vehicles, Toyota is focusing on fully electric vehicles and renewable energy sources. By increasing investment in green technologies and expanding its EV lineup Toyota aims to reduce fossil fuel reliance which is crucial for meeting global sustainability goals. Tools like SWOT helped identify Toyota’s strengths in hybrid technology and its dependency on fossil fuels, while PESTLEE analyzed external factors such as government regulations and consumer demand for sustainability. TOWS was used to develop strategies like expanding EV production and Force Field Analysis highlighted the driving forces such as support to achieve the goal and barriers like market uncertainty.

Toyota should work on its supply chain optimization and production processes to make them more sustainable by integrating eco-friendly practices across its operations. This includes increased battery electric vehicle production and improving energy efficiency in manufacturing to reduce carbon emissions. With its strong network of suppliers and dealers Toyota is in strong position to meet the rising demand for sustainable products. Supported by government subsidies and green initiatives which align with Toyotas goal of carbon neutrality along with consumers interest in eco-friendly options, Toyota is on track the right track to lead the automotive industry. Major investment in Tri-gen technology further emphasizes Toyotas commitment towards carbon neutrality.

Ultimately, Toyotas transition to fully electric vehicles, improved energy efficiency and usage of renewable energy will help Toyota meet its carbon neutrality goal by 2050.

## List of References

Attarwala, F. (2023). "Technical Glitch Suspends Toyota's Japan Operations Until Wednesday." from <https://www.investopedia.com/toyota-suspends-japan-operations-until-wednesday-7963031>.

Authority, A. G. C. C. "International implementation of vehicle emissions standards." from <https://www.climatechangeauthority.gov.au/reviews/light-vehicle-emissions-standards-australia/international-implementation-vehicle-emissions>.

Carrier, M. (2024). "Global automobile market share in 2023, by brand." from <https://www.statista.com/statistics/316786/global-market-share-of-the-leading-automakers/>.

Corporation, T. M. (2021). "Toyota aims for carbon neutrality by 2050."

Costello, M. (2022). "Greenpeace accuses Toyota of greenwashing, anti-EV lobbying." from <https://www.carexpert.com.au/car-news/greenpeace-accuses-toyota-of-greenwashing-anti-ev-lobbying>.

Europe, T. (2024). "Toyota Production System." from <https://www.toyota-europe.com/about-us/toyota-vision-and-philosophy/toyota-production-system>.

Firananda, D. (2019). "SWOT ANALYSIS: A THEORETICAL REVIEW." from <https://deanfiranandacom.wordpress.com/2019/03/12/swot-analysis-a-theoretical-review/>.

Global, T. (2023). "Toyota's Views  
on Climate Public Policies 2023." 6.

Gomatesh M. Ravanavar, D. P. M. C. (2012). "International Journal of  
Research and Development." 86,87.

Hall, H. (2023). "Toyota accelerating EV plans, in this week's R&D Power Index." from <https://www.rdworldonline.com/toyota-accelerating-ev-plans-in-this-weeks-rd-power-index/>.

Jurevicius, O. (2023). "SWOT Analysis of Toyota (6 Key Strengths in 2023)." from <https://strategicmanagementinsight.com/swot-analyses/toyota-swot-analysis/>.

katekebo (2023). "Toyota Customer Brand Loyalty falls to 7th place." from <https://www.toyotanation.com/threads/toyota-customer-brand-loyalty-falls-to-7th-place.1766761/>.

Lisa Ellram, P., CPM, CMA and P. Wendy Tate "Sourcing to  
Support the  
Green Initiative."



Miller, K. (2022). "An Exclusive and Elucidated SWOT Analysis of Toyota." from <https://crowjack.com/swot-analysis/toyota>.

Motor Corporation." 6.

Ungureanu, V., et al. Coordinating

Engineering for Sustainability

and Resilience" & Midterm

Conference of CircularB

"Implementation of

Circular Economy in the Built

Environment: 326.

Mirza, Z. (2023). "Toyota's carbon footprint rises despite emissions-curbing initiatives." from <https://www.esgdiver.com/news/toyotas-carbon-footprint-rises-despite-emissions-curbing-initiatives/702030/>.

Muehlegger, E. and D. S. Rapson (January 2021). "SUBSIDIZING LOW- AND MIDDLE-INCOME ADOPTION OF ELECTRIC VEHICLES:

QUASI-EXPERIMENTAL EVIDENCE FROM CALIFORNIA."

Muhammed Zakir Hossain, M. T., Fahiha Enam (2017). "The Art of Designing and Producing Product for Facing Global Challenges: A Study on Toyota Production System."

Nicholas, J. M. (1989). "Successful Project Management: A Force-Field Analysis." Journal of Systems Management **40**(1): 24.

Nkomo, T. "Analysis of Toyota

Motor Corporation." 6.

Pacific, G. A. (2022). "Toyota Ranked Last In Global Green Car Report." from <https://www.greenpeace.org.au/news/toyota-ranked-last-in-global-green-car-report/>.

Ramirez, M. (2024). "Toyota Motor: Business Model, SWOT Analysis, and Competitors 2024."

Pacific, G. A. (2022). "Toyota Ranked Last In Global Green Car Report." from <https://www.greenpeace.org.au/news/toyota-ranked-last-in-global-green-car-report/>.

Ramirez, M. (2024). "Toyota Motor: Business Model, SWOT Analysis, and Competitors 2024."

Sapp, M. (2024). "FuelCell Energy and Toyota launch first-of-its-kind "Tri-gen" system in California." <http://0-search.proquest.com.pugwash.lib.warwick.ac.uk/blogs-podcasts-websites/fuelcell-energy-toyota-launch-first-kind-tri-gen/docview/3049870583/se-2?accountid=14888>

Site, T. U. M. (2023). Toyota unveils new technology that will change the future of cars: 12, 13.

Takim, O. B. S. A. (2015). "Manufacturing defects in the automobile industry, a case study of the remote causes and effects of Toyota"s transmission malfunctions in cars." 15.

UK, T. "Supplier Relations." from <https://www.toyotauk.com/toyota-in-the-uk/supplier-relations#:~:text=Toyota%20believes%20in%20developing%20mutually,to%20enhance%20our%20business%20relationships>hip.