TB141Ic – ICT System Engineering and Rapid Prototyping
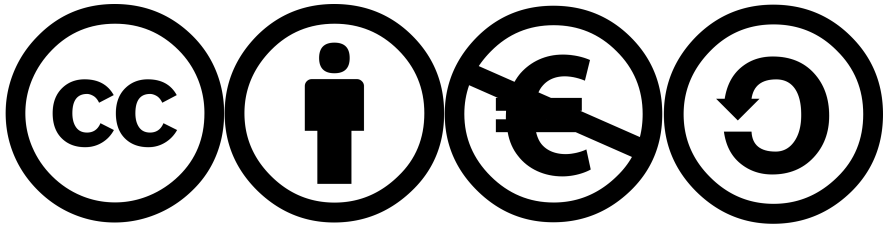
Socio-technical analysis and Q/A

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Licensing information

Learning objectives and related literature

Learning objectives

- Recall the most employed strategy frameworks
- Identify the components a PESTLE analysis
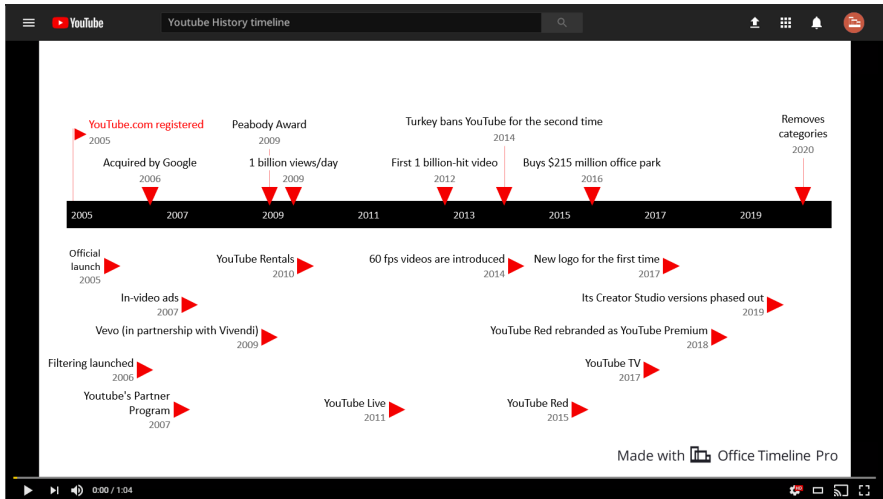- Analyze a given company/project using the PESTLE framework

Related literature

- Scanning the Business Environment, Aguilar. [1]

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[1] F. J. Aguilar (1967). *Scanning the business environment*. Macmillan

Socio-technical IT Systems

- So far, we focused on the technical aspects of ICT System development
  - Development methodologies
  - Software architectures
  - Hardware architectures
  - Hands-on development/prototyping (with Mendix)
- ...but as TBM/TPM engineers we should not forget the the societal aspects of these systems

Case study - YouTube (2)

Source: https://www.officetimeline.com/blog/youtube-history-timeline

Case study - YouTube (2)

- Worldwide adoption: Available in 103 countries
- Main revenue stream is driven by advertisement
- Recommender system proposes new videos in order increase permanence on the platform
- Led to the creation of new professions: content creators [2]
- Paradigm shift: From TV to streaming platforms [3]

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[2] https://blog.youtube/inside-youtube/youtubes-creative-economy-small-businesses-big-impact/

[3] https://www.cnbc.com/2021/03/10/youtubes-mohan-to-pitch-advertisers-on-connected-tv-boom.html

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In summary: socio-technical system (more than a simple IT system)

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[3] https://www.cnbc.com/2021/03/10/youtubes-mohan-to-pitch-advertisers-on-connected-tv-boom.html

Socio-technical system definition [4]
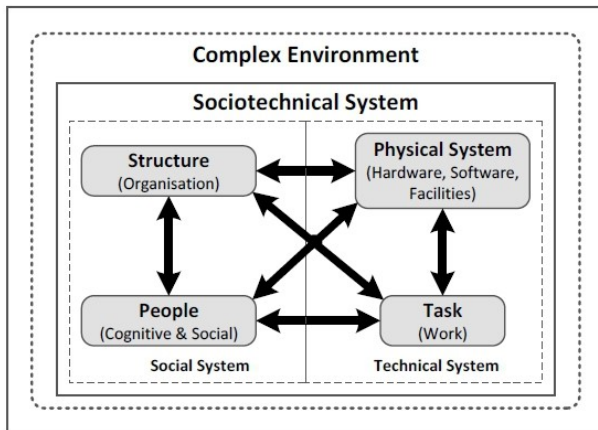
Figure 2: Sociotechnical system (STS) [4]

How can we evaluate the societal impact of an IT-system, in your opinion?

How can we evaluate the societal impact of an IT-system?

1. **Identify the stakeholders:**
2. **Determine the impacts:**
3. **Evaluate the impacts:**
4. **Consider the socio-technical factors:**
5. **Develop recommendations:**

How can we evaluate the societal impact of an IT-system?

1. **Identify the stakeholders:** Identify the groups or individuals who will be affected by the application.
2. **Determine the impacts:**
3. **Evaluate the impacts:**
4. **Consider the socio-technical factors:**
5. **Develop recommendations:**

How can we evaluate the societal impact of an IT-system?

1. **Identify the stakeholders:**
2. **Determine the impacts:** Identify the potential impacts of the application on stakeholders.
3. **Evaluate the impacts:**
4. **Consider the socio-technical factors:**
5. **Develop recommendations:**

How can we evaluate the societal impact of an IT-system?

1. **Identify the stakeholders:**

2. **Determine the impacts:**

3. **Evaluate the impacts:** Evaluate the positive and negative impacts of the application using a range of qualitative and quantitative methods. This could involve surveying stakeholders to gauge their perceptions and opinions, conducting a cost-benefit analysis to determine the economic impacts, and assessing the application's environmental impacts.

4. **Consider the socio-technical factors:**

5. **Develop recommendations:**

How can we evaluate the societal impact of an IT-system?

1. **Identify the stakeholders:**
2. **Determine the impacts:**
3. **Evaluate the impacts:**
4. **Consider the socio-technical factors:** Evaluate the social, economic, environmental, and technological factors that could affect the application's development, implementation, and use. For example, consider how the application could impact social interactions, how it could be integrated with existing technology systems, and what the costs and benefits of the application might be.
5. **Develop recommendations:**

How can we evaluate the societal impact of an IT-system?

1. **Identify the stakeholders:**
2. **Determine the impacts:**
3. **Evaluate the impacts:**
4. **Consider the socio-technical factors:**
5. **Develop recommendations:** Based on the analysis, develop recommendations for how to optimize the application's socio-technical impacts. This could include implementing certain features, changing the application's user interface, or modifying the application's pricing structure.

How can we evaluate the societal impact of an IT-system?

1. **Identify the stakeholders: Stakeholder Analysis**
2. **Determine the impacts: PESTLE Analysis**
3. **Evaluate the impacts: PESTLE Analysis**
4. **Consider the socio-technical factors: PESTLE Analysis**
5. **Develop recommendations: PESTLE Analysis**

Stakeholder analysis

Stakeholder analysis

1. **Identify the groups that will be directly or indirectly affected by the application.**
2. **Determine the interests and concerns of each stakeholder group**
3. **Evaluate the level of involvement of each stakeholder group**
4. **Determine the impact of the application for each stakeholder group**
5. **Consider the potential conflicts of interest between stakeholder groups**

Stakeholder analysis

Stakeholder	Involvement	Impact	Conflict of interest

- **Stakeholder:** What categories of people are directly or directly influenced by the application?
- **Involvement:** Is this category of people directly involved in the development of the application?
- **Impact:** What is the impact of the application for this category of users? What the application can do for them?
- **Conflict of interest:** Is there any conflict of interest among the different stakeholders of the application?

Strategy framework

Working definition

Strategy frameworks, or strategic frameworks, are methods that businesses use to outline plans to achieve future goals. It aims to demonstrate how a business or department plans to use projects and other initiatives to uphold the overall vision of stakeholders.

- Different stategy framework exist
- Each of them give a different perspective of the business under analysis

Strategy framework

Working definition

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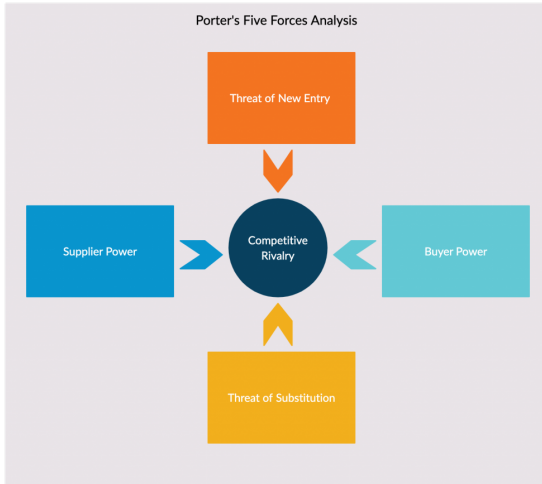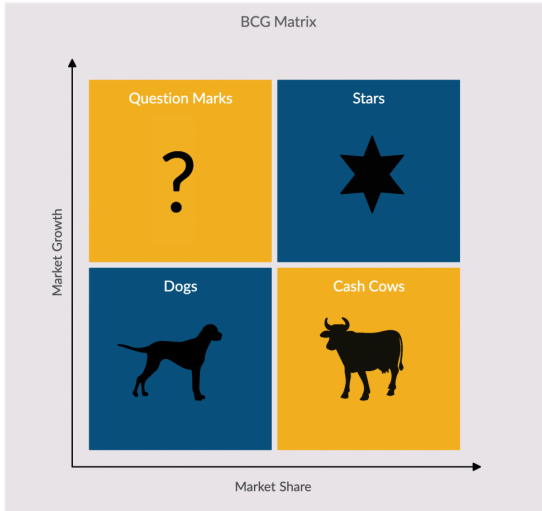
- Different stategy framework exist
- Each of them give a different perspective of the business under analysis $\Rightarrow$ Complementary views

Strategy framework - Porter's five forces

Source: https://creately.com/blog/diagrams/top-strategy-frameworks-for-businesses/

Strategy framework - BCG Matrix

Source: https://creately.com/blog/diagrams/top-strategy-frameworks-for-businesses/

Strategy framework - GE-McKinsey Matrix

Source: https://creately.com/blog/diagrams/top-strategy-frameworks-for-businesses/
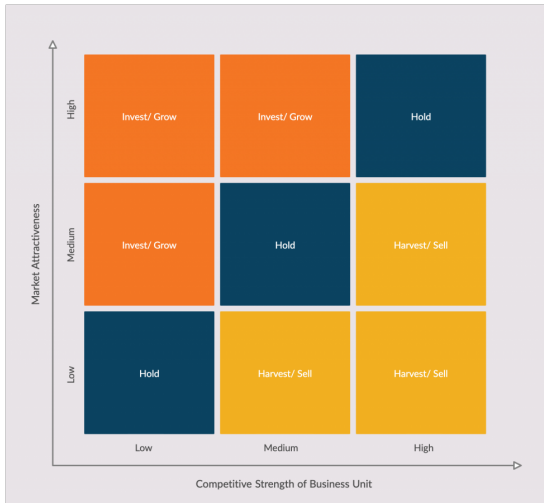
Strategy framework - VRIO Analysis

Resources	Is it Valuable?	Is it Rare?	Is it hard to Imitate?	Are we Organized to capture value?	Recommendations
Resource 1					
Resource 2					
Resource 3					
Resource 4					
Resource 5					
Resource 6					

Source: https://creately.com/blog/diagrams/top-strategy-frameworks-for-businesses/

Strategy framework - SWOT Analysis

Source: https://creately.com/blog/diagrams/top-strategy-frameworks-for-businesses/
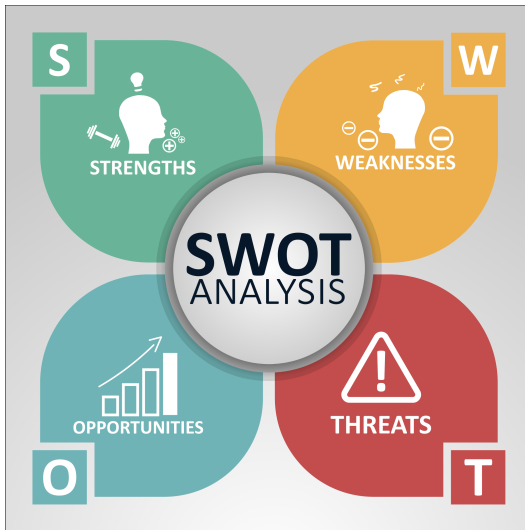
PEST(LE) Analysis

Strategy framework - PEST Analysis

- Developed by prof. Francis Aguilar in 1967 [5]
- PEST Analysis is useful for four main reasons:
  - Identifies business or personal opportunities, and warnings of any significant threats.
  - Identifies direction of change within your business environment (to adapt rather than fight change)
  - Analyzes risks in your environment as well (to avoid starting projects that are likely to fail)
  - Provides objective view of new and different markets, so you can base business decisions on facts rather than unconscious assumptions.

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[5] F. J. Aguilar (1967). *Scanning the business environment*. Macmillan

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Strategy framework - PESTLE vs SWOT Analysis
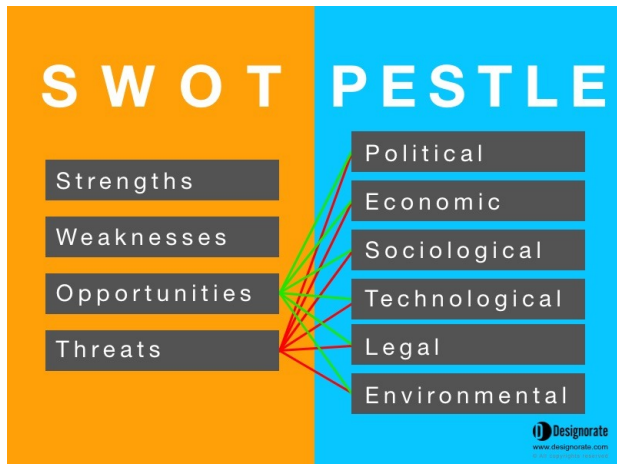
- PEST Analysis looks at "big picture" factors that might influence a decision, a market, or a potential new business.

- SWOT Analysis explores these factors at a business, product-line or product level.

Source: https://www.designorate.com/pestle-analysis-and-when-to-use-it/

Political
Economic
Socio-Cultural
Technological

Political

1. When is the country's next local, state, or national election? How could this change government or regional policy?

2. Who are the most likely contenders for power? What are their views on business policy, and on other policies that affect your organization?

3. Depending on the country, how well developed are property rights and the rule of law, and how widespread are corruption and organized crime? How are these situations likely to change, and how is this likely to affect you?

4. Could any pending legislation or taxation changes affect your business, either positively or negatively?

5. How will business regulation, along with any planned changes to it, affect your business? And is there a trend towards regulation or deregulation?

6. How does government approach corporate policy, corporate social responsibility, environmental issues, and customer protection legislation? What impact does this have, and is it likely to change?

7. What is the likely timescale of proposed legislative changes?

8. Are there any other political factors that are likely to change?

Political
Economic
Socio-Cultural
Technological

Economical

1. How stable is the current economy? Is it growing, stagnating, or declining?

2. Are key exchange rates stable, or do they tend to vary significantly?

3. Are customers' levels of disposable income rising or falling? How is this likely to change in the next few years?

4. What is the unemployment rate? Will it be easy to build a skilled workforce? Or will it be expensive to hire skilled labor?

5. Do consumers and businesses have easy access to credit? If not, how will this affect your organization?

6. How is globalization affecting the economic environment?

7. Are there any other economic factors that you should consider?

Political
Economic
Socio-Cultural
Technological

Socio-cultural

1. What is the population's growth rate and age profile? How is this likely to change?

2. Are generational shifts in attitude likely to affect what you're doing?

3. What are your society's levels of health, education, and social mobility? How are these changing, and what impact does this have?

4. What employment patterns, job market trends, and attitudes toward work can you observe? Are these different for different age groups?

5. What social attitudes and social taboos could affect your business? Have there been recent socio-cultural changes that might affect this?

6. How do religious beliefs and lifestyle choices affect the population?

7. Are any other socio-cultural factors likely to drive change for your business?

Strategy framework - PEST Analysis - Questions

Political
Economic
Socio-Cultural
Technological

Technological

1. Are there any new technologies that you could be using?

2. Are there any new technologies on the horizon that could radically affect your work or your industry?

3. Do any of your competitors have access to new technologies that could redefine their products?

4. In which areas do governments and educational institutions focus their research? Is there anything you can do to take advantage of this?

5. How have infrastructure changes affected work patterns (for example, levels of remote working)?

6. Are there existing technological hubs that you could work with or learn from?

7. Are there any other technological factors that you should consider?

Strategy framework - PESTLE Analysis - Factors

Political
Economic
Socio-Cultural
Technological
Legal
Environmental

Political

1. Government stability
2. Level of bureaucracy
3. Extent of corruption
4. The freedom of press
5. Home market lobbying and import restrictions
6. Tax policies
7. Trade control
8. Tariffs
9. Activities of trade unions

Strategy framework - PESTLE Analysis - Factors

Political
Economic
Socio-Cultural
Technological
Legal
Environmental

Economical

1. Macroeconomic climate in the country
2. Inflation rate
3. Interest rate
4. Currency exchange rate
5. Tax rates
6. Rate of unemployment
7. Cost of labor
8. Avaialability of credit
9. Changes in disposable income of consumers
10. Government's monetary and fiscal policies

Strategy framework - PESTLE Analysis - Factors

Political
Economic
Socio-Cultural
Technological
Legal
Environmental

Socio-cultural

1. Changing family values
2. Childless families
3. Same sex marriages
4. Aging population
5. Population growth rate
6. Health-consciousness of population
7. Level of education
8. Consumer attitude towards imported products and services
9. Changes in consumer purchasing habits
10. Impact of religion and beliefs

Strategy framework - PESTLE Analysis - Factors

Political
Economic
Socio-Cultural
Technological
Legal
Environmental

Technological

1. Industry-specific technological innovations
2. Increasing popularity of e-commerce
3. Increasing integration of IT and internet into business processes
4. Changes in technological infrastructure
5. Rate of technological change
6. Changes in communication infrastructure

Strategy framework - PESTLE Analysis - Factors

Political
Economic
Socio-Cultural
Technological
Legal
Environmental

Legal

1. Trade regulation/de-regulation
2. Regulation of competition
3. Anti-trust rules and regulations
4. Discrimination law
5. Copyrights, patents and intellectual property law
6. Data protection law
7. Employee health and safety rules and regulations

Strategy framework - PESTLE Analysis - Factors

Political
Economic
Socio-Cultural
Technological
Legal
Environmental

Environmental

1. Increasing media coverage of environmental issues
2. Climate change
3. Global warming
4. Environmental pollution
5. Impact of activities of non-government environmental organizations
6. Ozone de-layering
7. Consumer attitudes towards 'green' products

PESTLE Analysis - Variants

- **PESTLIED:** Political, Economic, Socio-Cultural, Technological, Legal, International, Environmental, Demographic.
- **STEEPLE:** Social/Demographic, Technological, Economic, Environmental, Political, Legal, Ethical.
- **SLEPT:** Socio-Cultural, Legal, Economic, Political, Technological.
- **LONGPESTLE:** Local, National, and Global versions of PESTLE. (These are best used for understanding change in multinational organizations.)

Strategy framework - PESTLE Template

PESTLE Analysis Cheat Sheet

P	E	S	T	L	E
Political	**Economical**	**Social**	**Technological**	**Legal**	**Environmental**

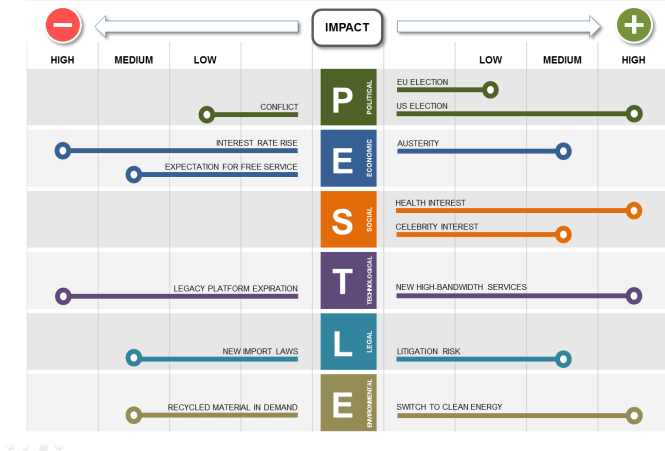| Explore:	Explore:	Explore:	Explore:	Explore:	Explore:
• Government stability • Financial stimulus commitment • Pandemic strategic plan • Health service readiness • Pandemic policy factors • Current taxation policy • Future taxation policy • The current and future political support • Grants, funding and initiatives • Trade bodies • Effect of wars or worsening relations with particular countries • Election campaigns • Issues featuring in political agendas	• National debt levels • Recovery struggle for impacted industry • Strength of consumer spending • Current and future levels of government spending • Ease of access to loans • Current and future level of interest rates, inflation and unemployment • Specific taxation policies and trends • Exchange rates • Overall economic situation • Real estate exodus • Inner city business decline • Supply volatility	• Pandemic lifestyle trends • demographics • consumer attitudes and opinions • media views • law changes affecting social factors • brand, company, technology image • consumer buying patterns • fashion and role models • major events and influence • Inner city pandemic trends • ethnic/religious factors • ethical issues • Digital relationships	• Relationship with pandemic • Sector technology demand • Relevant current and future technology innovations • The level of research funding • The ways in which consumers make purchases • Intellectual property rights and copyright infringements • Global communication technological advances • Internet connectivity utility	• Legislation in areas such as employment, competition and health & safety • Environmental legislation • Future legislation changes • Changes in European law • Trading policies • Regulatory bodies • Pandemic legislation • Working environment • Pandemic legal sensitivities	• Relationship with global warming • Relationship with recycling and global fight against waste • Relationship with global fight against plastic usage • The level of pollution created by the product or service • Attitudes to the environment from the government, media and consumers • Relationship with renewable energy • Relationship with deforestation

Source: https://creately.com/blog/diagrams/top-strategy-frameworks-for-businesses/

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Strategy framework - PESTLE Template

Source: https://creately.com/blog/diagrams/top-strategy-frameworks-for-businesses/

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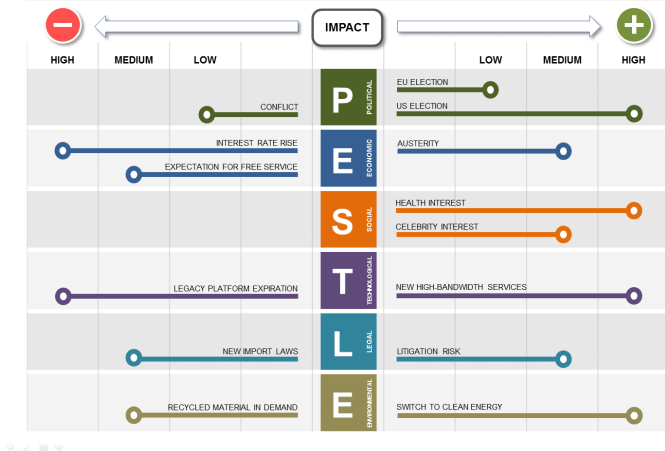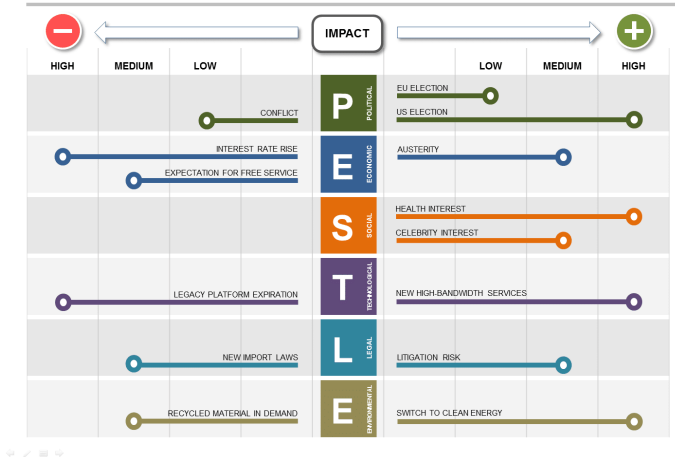
PESTLE Analysis - Examples of risk analysis

- AirBnb
- Amazon
- IKEA
- Tesla

Source: https://research-methodology.net/category/pest-analyses/

Summative Assignment - Socio-technical analysis

For the summative assignment, you will need to perform a socio-technical analysis of your application (TooGoodToGo-like):

1. Perform a stakeholder analysis
2. **For a single stakeholder**, perform a modified PESTLE analysis:
   - Rather than focusing on the threats/opportunities, focus on the impact/consequences for each area.
   - Use the provided template (on Brightspace), and provide at least two factors for each area: one with a postive impact/one with a negative impact.

The final deliverable will contain:

- Stakeholder table
- PESTLE matrix together with the motivations of your classification