



**Smarter Regulation of Waste in Europe
(LIFE13 ENV-UK-000549)
LIFE SMART Waste Project**

Action B3:

Competitive Intelligence Literature Review

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1.0 Executive Summary

This report assesses the feasibility of applying Competitive Intelligence (CI) tools and techniques in an environmental regulatory environment to provide information and insight in support of eradicating the opportunities and vulnerabilities that give rise to waste crime.

CI is defined as methods and tools to legally **collect** external and internal information, according to defined Key Intelligence Topics; its **analysis** to create an understanding of the strategic environment; and the **dissemination** of this information and knowledge to help anticipate opportunities or threats, and take the right decisions in response.

If the use of CI in the public sector has recently gained some ground around the world, our reviews of available academic and professional literature shows that it is mainly scenario analysis, a single CI analytical technique, has been used by environmental agencies. With this in mind, the application of CI specifically to identify market circumstances leading to waste crime is new. This study identifies and describes the opportunities offered by the use of CI tools and techniques and which key bodies involved with addressing waste crime should consider adopting in their work to identify and tackle waste crime.

The report introduces a suite of techniques that could help regulatory agencies obtain enhanced intelligence and insights regarding criminal groups and the waste crime market. Each CI analytical tool is introduced and its strengths and weaknesses for regulators provided. The report introduces techniques that could give the regulator insight and actionable intelligence about known threats, but also support the detection of potential new ones. For instance, the 8 forces of Bisson will help regulators in profiling operators in the market, whereas Blind Spot techniques will help lead to a better understanding of known threats. CI also enhances our understanding of the strategic environment, and techniques such as Strategic Dynamic Analysis; Ansoff Matrix and Porter's Four Corners will provide strategic early warning intelligence to environmental regulators.

As in any field on intelligence, it is the development of key intelligence questions that will lead to the right choice of CI technique. The purpose of this report is provide a baseline towards the development of a CI user manual for intelligence officers and analysts tackling waste crime, and in which CI techniques will be fully described.

2.0 Introduction

2.1 Background

All public organisations need to “do more for less”. This is particularly true for most environmental agencies which, in addition to their traditional pollution control and inspection regimes, are now expected to support businesses in achieving sustainable economic growth. In order to support agencies achieve these ambitious objectives and support legitimate businesses, the transfer of methods and tools from the private sector to the public could be valuable. This literature desktop study assesses the feasibility of applying Competitive Intelligence (CI) tools and techniques in an environmental regulatory environment to provide information and insight in support of eradicating the opportunities and vulnerabilities that give rise to waste crime.

Although there are many different definitions of CI, this report adopts a much less restrictive one. CI can be defined as methods and tools to legally **collect** external and internal information, according to the defined Key Intelligence Topics; its **analysis** to create an understanding of the strategic environment; and the **dissemination** of this information and knowledge to help anticipate opportunities or threats and take the right decisions in response.

Given the confidential nature and commercial sensitivities associated with the use of CI, evidence of its value is difficult to obtain. The value of CI, however, is demonstrated through the tangible results reported in Table 1 for Altix, a High Tech Small Medium Enterprise (SME) in Normandy, and which shows that CI does provide insight and intelligence in a number of strategic areas: market understanding; customers and competitors; technological developments and suppliers.

Table 1: Examples of results obtained from CI in Altix¹

Improvement area	Examples of information detected	Examples of action
Markets	Fast detection of the first signs (downward or upward) of the markets; Precise knowledge of the PCB production	Diversification of activities
Customers	Fast detection of investments intentions. Messages from customers about the spare market won thanks to our new machines on the Internet	Credibility is better; customers are more confident; thus they speak more. The image of the firm is reinforced. The decisions/reactions are better founded and allow 'to sell better'
Competitors	New competitors. Collaboration between competitors. Machines problems	Benchmark of our machines

¹ For more information, see (Bisson, 2003)

Improvement area	Examples of information detected	Examples of action
Technology	Collection of patent	Determination of the intellectual property policy of a competitor. Creation of new machines
Suppliers	New suppliers for the UV lamps	Find the best suppliers. We pull down prices
Material producers	New ink. New epoxy board	Modifications on the machines
Productivity	Determination of the information needs of the employees (use of a questionnaire validated by the direct manager)	Only one person and/or software send information to all the employees
ISO standard 2000/9001	Following of the customer satisfaction	Creation of quality indicators. We obtained easily the ISO standard 2000/9001 certification
Protection	Detection of rumours about the company on the Internet	Counter action to destroy the rumour

This report proposes that CI provides environmental agencies with an additional range of methods and tools which will enhance their current suite of intelligence collection and analysis approaches. The strength of CI is that they are applied to a broad range of business situations and fields of interest which regulators are generally not currently equipped to undertake.

2.2 Purpose of the report

Environmental regulators and their partners need new investigative tools and methods to better understand and respond to the commercial and market circumstances in which waste crime emerges. Agencies which understand the dynamics of the waste market, the actors operating within it, their strengths, weaknesses and inter-relations, will better understand the drivers and causes that motivate or allow waste crime. CI has the potential to give us these tools and methods. By adapting analytical approaches used by commercial companies to identify competitive opportunities for wealth generation, environmental agencies could better detect similar points of opportunity within the sector; assess their vulnerability to illicit operators; as well as support access to these opportunities by legitimate operators before waste criminals can take advantage of them, CI could give the environmental regulator a strategic understanding of the waste environment today so that it is better placed to anticipate and react to what might happen tomorrow.

The use of CI in the public sector has recently gained some ground around the world² and our searches into academic and professional literature demonstrate that its application in the environmental arena has mostly been around anticipating climate change and biodiversity scenarios through the work of the UN Intergovernmental Panel on Climate Change and the European Environment Agency. The use of CI specifically to identify market circumstances leading to waste crime is new and presents an innovative and exciting adaptation of commercial approaches in the work of environmental regulators.

The purpose of this report is to identify and describe CI tools and techniques which key bodies involved with addressing waste crime could consider adopting in their work to identify and tackle waste crime. The report will introduce some techniques that could give the regulator insight and actionable intelligence in key areas of commercial understanding of the waste market; the structure and competitiveness of the industry, its future market size and operation, as well as the competitive strategies of operators within the sector.

3.0 CI in the public sector and in environmental protection

It is now well established that the knowledge of waste crime is limited, and based only on best estimates. Environmental regulators and law enforcement partners need new tools and methods to increase the quality and quantity of intelligence gathered and analysed to support efforts in eradicating this crime. Traditional means of tackling waste crime are not obsolete, of course, but they can be enhanced considerably by new methods and insights such as CI techniques that could enhance regulatory understanding of the market drivers and causes that motivate or facilitate opportunities for waste crime.

The most visible use of a CI tool by the public sector is *horizon scanning*. First coined in 1967, horizon scanning allows a public or private organisation to monitor its strategic environment according to specific topics of interest by using all relevant sources including human intelligence, public media and even monitoring software of online sources. It is an important technique because by considering future drivers of change, it balances more traditional trend analyses of data which are, essentially, extrapolations of the past. Scanning in the public sector is increasingly being used at both policy and service levels, and some governments have certainly applied it in support of identifying and implementing new industrial policies and business opportunities that allow for the rise of new industries.

The most visible and accessible examples of governments' scanning are The Horizon Scanning Research and Intelligence Centre, which was developed and supported by the Government Office for Science in the United Kingdom³, and the European Foresight Monitoring Network⁴. Further afield, scanning approaches have been adopted as an innovation method in the Australian Public Sector's Innovation Tool Kit; as a method to inform capability management in the New Zealand Government's Capability Tool Kit; as a collaborative exercise across public agencies in the Australasian Joint Agencies Scanning Network (AJASN) and as a central component in the *ePOOLICE* framework to detect and tackle future threats associated with organised crime in Europe.

² See (Bisson, 2014) for more information

³ For more information:

<https://academic.oup.com/jpubhealth/article/doi/10.1093/pubmed/fdw039/3002966/Wider-horizons-wiser-choices-horizon-scanning-for>

⁴ https://ec.europa.eu/research/social-sciences/pdf/other_pubs/efmn-report_en.pdf

Some components of a CI framework can provide competitive advantages to governments and public organisations by leveraging their capacity to anticipate issues and opportunities allowing them to influence events in their favour⁵. However, the application of CI in the environmental sphere is still quite limited.

A CI framework that combines an assessment of **known** threats, for example from organised crime groups operating in the waste sector, and a strategic early warning approach which identifies **potential** threats is absent and that would help to tackle waste crime. An environmental agency that successfully adopts and adapts such a CI framework – with the necessary structure, roles, and IT tools – would stand a better chance of influencing the regulatory environment, obtaining insights about the main stakeholders in the waste crime market, as well as anticipating the threats and opportunities impacting on the delivery of sustainable economic performance in the environmental arena.

The questions environmental regulators and waste crime investigators need to answer regarding structures, and the related CI techniques to answer those questions are presented in the next section.

4.0 What do environmental regulators need to know and the related CI techniques?

4.1 What do environmental regulators need to know?

Agencies which understand the dynamics of the waste market, the actors operating within it, their strengths, weaknesses and inter-relations, will better understand the drivers and causes that motivate or allow waste crime. CI has the potential power to give to environmental agencies the necessary tools and methods to provide this type of analysis. By adapting analytical approaches used by commercial companies to identify competitive opportunities for wealth generation, environmental agencies could detect similar points of opportunity within the sector; assess their vulnerability to illicit operators; and support access to these opportunities by legitimate operators before waste criminals can take advantage of them.

There are a number of key business questions about the commercial environmental that, if they could be answered, would enhance regulators' and investigators' understanding of the waste market and allow us to design interventions at appropriate points in the market.

Key questions that would help regulators include:

- Who are the competitors within the sector or waste stream at the moment?
- What are their strengths and weaknesses?
- What are their overall plans and goals in the market for the next 2 -5 years?
- What new directions are they likely to take in the future?
- What regulatory issues will they face and how will this impact on costs?
- What other issues are likely to emerge and what will be the impact?

⁵ See (Bisson, 2014)

The next section examines the CI techniques that could help us to answer those types of questions.

4.2 CI techniques to help solve regulators key questions

Competitive Intelligence professionals follow the intelligence cycle (see Figure 1). It begins with the needs or requirements of the policymakers and other decision makers who need information for their activities. These requirements are sorted, prioritised and used to drive collection activities. The intelligence cycle, as depicted in the figure below is repeated until an intelligence requirement has been satisfied.

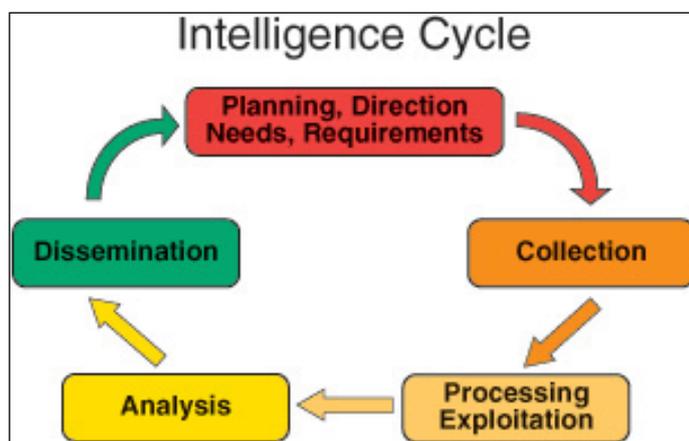


Figure 1 - The Intelligence Cycle

4.2.1 Planning, direction needs and requirements

The first key stage is to define our Key Intelligence Topics (KITs), i.e. the topics about which environmental agencies need to gather data and information. Some of them should be constantly gathered which constitute horizon scanning. To create the KITS, one can use interviews, questionnaires to get inputs from internal/external experts in the waste crime field, observations for instance. An example of KIT in our context is "Who are the competitors within the sector or waste stream at the moment?"

4.2.2 Collection and processing

Hence, one organisation will be able to make the plan and collect data/information accordingly to **control the known threats** and **to detect potential ones** as a *strategic early warning approach*. After collecting data/information and processing them, the analysis stage starts.

4.2.3 Analysis

The aim of the analysis stage is to *synthesise and interpret the information* collected to obtain insights about the threats allowing one to understand *market drivers and trends* to anticipate the next strategic movements in the market and thereby to detect its potential threats. The following table identifies a number of CI techniques which could be applied to in analysing the market circumstances that lead to waste crime:

- (1) Firstly, the techniques whose aim is to allow environmental regulators to assess the known threats (table 2) and
- (2) Secondly, techniques that support the detection of potential threats as a Strategic Early Warning Approach (table 3).

Table 2: CI techniques for analysis to assess the known threats

Questions addressed in the frame of waste crime to assess the known threats	CI techniques for analysis
<i>What are the changes in the strategic environment?</i>	Horizon scanning
<i>What are the forces at macro level that impact the waste crime market?</i>	PESTELL
<i>What are the inherent forces of the waste crime market?</i>	8 forces of Bisson
<i>What are the existing products / services in the waste crime market? What is their "performance"? What are the opportunities that exist in the market?</i>	BCG matrix
<i>What are the strengths / weaknesses of competitors in the market?</i>	Profiling
<i>What are the most effective actors to fight against waste crime? What are the most dangerous practices in the market?</i>	Benchmarking
<i>What are the Strengths /Weaknesses of actors? What are their opportunities and threats?</i>	SWOT
<i>Is the strategy of an actor in line with the trends of the market?</i> <i>Is their strategy congruent with the market trends?</i>	Blind spot

Table 3: CI techniques for analysis to detect potential threats

Questions addressed in the frame of waste crime	CI techniques for analysis
<i>What are the trends of the market?</i>	Dynamic strategic mapping
<i>What is the maturity level of a waste crime?</i> <i>How can it potentially evolve?</i>	Industry/Product maturation
<i>What can be the market size?</i>	Future market size analysis
<i>What are the existing products/services in the waste crime market? What is their "performance"? What are the opportunities that exist in the market?</i>	Product/service positioning
<i>What are the next potential strategic movement of actors and associated risks for them?</i>	Ansoff Matrix

<i>What are the drivers of criminals? What are their assumptions? What will be their strategy? What are their capabilities?</i>	The 4 corners
<i>What are the main potential impacting scenarios of the market and their consequences?</i>	Scenario analysis
<i>What are the most efficient and effective regulations to fight against waste crime? What will be the reaction of criminals, market shifts according to new strategy of environmental regulators?</i>	War game

5.0 CI techniques used to assess known threats

5.1 8 forces of Bisson

8-forces is a technique which identifies the market drivers of an organisation⁶. It is based on eight questions or points of interest and provides an analysis which could help environmental regulators to determine how these forces influence the micro environment within the waste market.

- **The rivalry between established firms:** it depends on economies of scale, product differentiation, capital requirements, costs of change, access to distribution channels, cost disadvantage and government policy.
- **The barriers to enter the market:** Important factors are the number of competitors in the same sector, market growth, fixed costs, differentiation, increased capacity, intensity of strategic issues and barriers to exit.
- **The products / services / technologies of substitution:** it is about the products / services / technologies that fulfil the same function or products / services that compete for the purchasing power of the buyer.
- **The bargaining power of customers:** It occurs for example when a buyer has a large share of the seller's turnover, when products are poorly differentiated, when the cost of substitution is low, when buyers make little profit or loss, when buyers threaten to diversify upstream, when the seller's product has low impact on the quality of the final product of the buyer, when the buyer is very well informed.
- **The bargaining power of suppliers:** For example when suppliers are a small number of companies, when there are few substitutes, when the industry is not important for groups of suppliers, when the supplier's product is strategic for the buyer, when products of the suppliers are much differentiated.
- **The bargaining power of skilled workers:** It will be stronger when their trade unions are strong, when their opportunity to find a job is greater either because the labour market is dynamic or because their skills are particularly rare and needed.
- **The bargaining power of distributors:** They are particularly strong when producers cannot sell directly to customers and when only few companies can distribute products.

⁶ These are the indicators based on the prominent 5 forces of Porter (1980) to which were added three new forces by Bisson (2016).

- **The complementary products/ services / technology:** It relates to the complementary level with other products / services / technology that can lead to a transformation and collaborative strategies. If one organisation can link its products /services / technology to other existing organisations then it can lead to a competitive advantage.

Strength: Innovative and easy to use to determine the market drivers and their forces.

Weakness: Provide only the 'big picture' for each of the 8 forces.

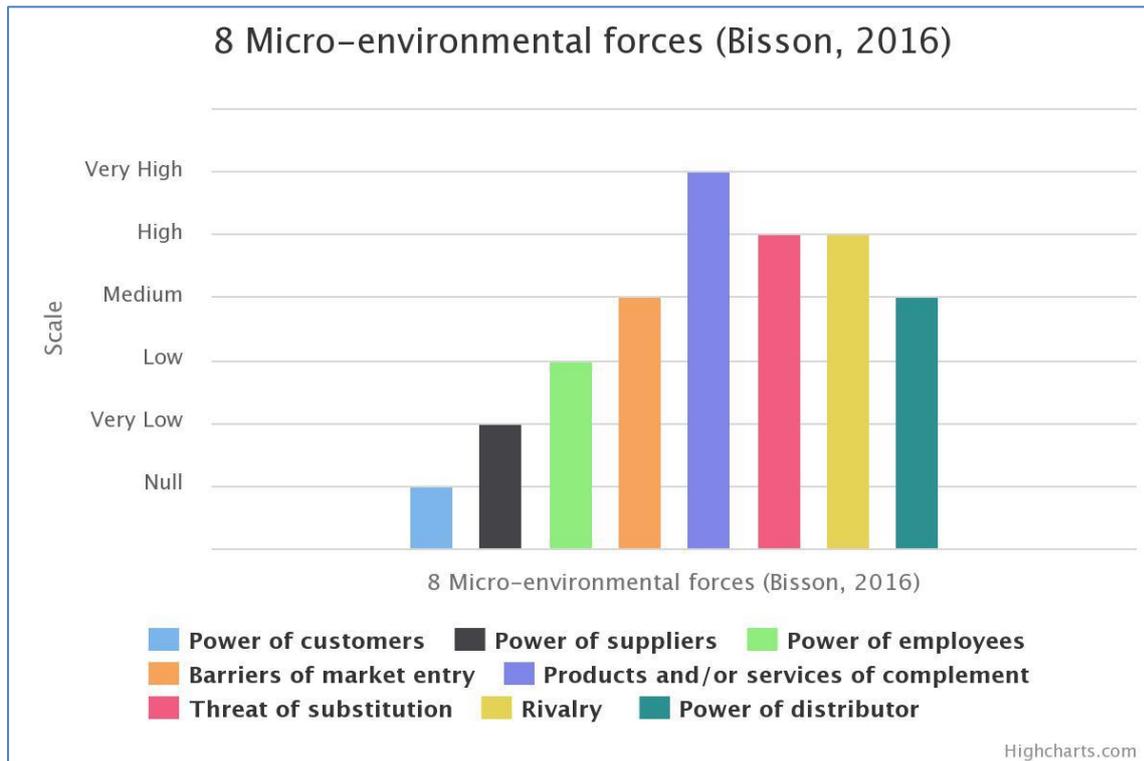


Figure 2. Example of 8 forces

5.2 Blind Spot

Blind spot allows analysts to detect potential strategic misunderstandings and mistakes, and the weaknesses of organisations which could then drive non-compliance or criminal behaviours. The technique is based on three steps⁷:

1. **Perform market imbalance:** look for trends that are changing the power of market players (use the 8-forces of Bisson)
2. **Identify a criminal organisation management assumptions and beliefs about the market:** make a strategy reverse engineering. Examine their actions, communications and investments to understand the strategy. For instance, if a company hires new people, the profile, skills, knowledge would make one understand what the company aims to do.

⁷ See (Gilad, 2008)

3. **Compare 1 and 2:** if there is a gap between 1 and 2, then there is a **blind spot that environmental regulators for example could use to target likely criminal businesses and operators.**

A well-known example of where a blind spot was determined is Kodak. In spite of the market shifting toward digital cameras under the influence of Japanese companies, when patents were registered and customers starting buying these cameras, they kept investing and developing older chemical cameras as the market leader had a high value supply chain at that time. The result of continuing to develop chemical cameras is that they went into bankruptcy.

There are plenty of further examples (e.g. Nokia) and as markets move faster, there will also be growing blind spots that lead to heavy consequences for private organisations and also governments.

Strength: A must for any Intelligence organisation that wants to understand the next strategic movements of actors in the market.

Weakness: Better done with a group of analysts that can brainstorm and complete the strategic profile of the organisation.

Additional CI techniques are referenced in [Annex I](#).

6.0 CI techniques to detect the potential threats as a Strategic Early Warning Approach

In addition to using CI techniques to assess known threats, its techniques can also be used to help detect potential threats in the waste market. CI techniques such as Dynamic Strategic Mapping and the Ansoff matrix have the potential to identify trends and potential strategic movements in the waste market, and implications for waste crime.

6.1 Dynamic strategic mapping

Dynamic strategic mapping allows analysts to construct a model of an organisation's strategic environment and to detect trends in the market. It works on the basis that, after determining the important topics and sub-topics based on the CI techniques used to assess known threats (8-forces⁸ to analyse the micro environment and PESTELL⁹ to analyse the macro environment), one can detect what might vary in the waste crime market and therefore what trends analysts should monitor. The use of such methods, adapted by environmental regulators, could help us anticipate threats in the waste crime market for instance (see figure 3).

Strength: Innovative. It leads to a deep understanding of the market and to determine what the trends are.

Weakness: It requires expertise in various fields to get the best possible model of the market.

⁸ Created by Bisson (2016)

⁹ PESTELL acronym stands for political, economic, social, technological, environmental, legal factors and lobbying impacting organisations.

6.2 Ansoff Matrix

As businesses and companies need to find new ways to increase their profits and reach new customers, they build new plans for that purpose. The **Ansoff Matrix** is an analytical technique that aims to understand the potential actions for organisations (see figure 4) and associated risks. So, each time one organisation changes its strategy to move into a new quadrant (horizontally or vertically), risk increases.



Figure 4 - Ansoff matrix

As an example, see figure 5 in which Ansoff's Matrix helps provide strategic direction for Carrefour's development. Market penetration deals with how to increase Carrefour's sales and profit in the existing market and is the least risky strategy. Market Development is riskier as it needs to sell existing product to the new market in the sense of global expansion. Product development is used generally by companies that are well established in the market as the risk is high. Diversification is the riskiest strategy as one company leaves the present market and product that might be beneficial in the future.

		MARKET	
		EXISTING	NEW
PRODUCT	EXISTING	MARKET PENETRATION Increase the share of grocery <i>Lowest risk</i>	MARKET DEVELOPMENT Expand abroad <i>Riskier compared to market penetration</i>
	NEW	NEW PRODUCT DEVELOPMENT Development of financial services <i>Riskier compared to market penetration</i>	DIVERSIFICATION Develop luxury product <i>Highest risk</i>

Figure 5 - Ansoff matrix - Growth of Carrefour as an example

Using the Ansoff matrix, environmental regulators could determine the potential actions of waste criminals and the associated consequences and risks to be one step ahead to avoid the issues.

Strength: Helps to visualise the potential actions and associated risks in the market.

Weakness: It relies a lot on the knowledge of experts.

Additional CI techniques are referenced in [Annex I](#).

7.0 Conclusions & recommendations

Competitive Intelligence application in environmental protection has been limited mainly to scenario analysis. As Galvin (2016) and Hope (2015) stressed there is a need for new tools and methods to know the fast moving and transforming waste crime market and to tackle waste crime.

Competitive Intelligence techniques can provide adequate solutions and would thereby enhance existing criminal intelligence methods applied by our analysts and intelligence experts. The enhanced use of such techniques would allow a model of the waste market to be created to obtain a sharp understanding of waste crime actors, to get insights to understand the market drivers and causes that motivate or allow waste crime. It would help to predict the future, and it could support efficient and effective actions to anticipate these crimes.

The next step after this desktop literature review, will be the creation of a manual of CI techniques providing in-depth details for each technique and a CI framework which will be provided to address the known threats and potential ones of the waste crime market.

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Annex I – Additional CI techniques

Annex I contains a selection of additional CI techniques in addition to Sections 5.0 and 6.0.

Those CI techniques listed below can be used to both assess known threats and detect the potential threats as a strategic early warning approach for the environmental regulators. Some CI techniques currently applied to the SEPA-led LIFE SMART Waste project include horizon scanning, PESTEL and SWOT.

Additional CI techniques used to assess known threats

(1) Scanning

Scanning was first coined in 1967 and allows a public or private organisation to monitor its strategic environment according to all important topics by using all relevant sources such as human intelligence, print media, and increasingly software which monitors online information. It has been found that successful organisations differ from the unsuccessful ones in that they do more scanning and have a broader pattern of scanning. Scanning would allow environmental regulators to **get real time information about known threats**.

Strength: It can help one organisation to control its strategic environment.

Weakness: As the number of data to scan rises, it becomes increasingly challenging to gather and process data/information. Analysis is weak as people filter and interpret data/information according to their knowledge, heuristics, pre-conceptions and requires to be completed with other analytical techniques.

(2) PESTELL

PESTELL¹⁰ is a technique in which the analyst identifies forces that could affect and impact upon an economic market. It is a technique that allows the analyst to assess the macro environment, and encompasses:

- **Political factors:** It refers to government policy such as the degree of intervention in the economy, governments' attitude and tax policies.
- **Economic factors:** It deals with for example economic growth, sector performance of the economy as a whole, credit accessibility, interest rates and inflation.
- **Social factors:** It is concerned with changes in social trends and lifestyle, population demographics (e.g. aging population), distribution of wealth, locational factors (urban, peri-urban and rural) and educational levels among others.
- **Technological factors:** It is about the pace of technological innovations and obsolescence, new technological platforms, in a general manner the importance of technology in the market.
- **Environmental factors:** It deals with recycling, land, air and water pollution, popular attitudes towards the environment among others.
- **Legal factors:** these are related to the legal environment in which the company operates such as employment regulations, Intellectual Property regulations, health

¹⁰ See (Kotler and Armstrong, 2004)

and safety regulations and product/service regulations. Yet, it deals with unintended consequences and contradictions between laws (e.g. Scotland/UK).

- **Lobbying factors:** Interest groups, landowners, trade bodies and organized crime (could push for weaker laws or loopholes).

Strength: Provides a detailed description of the macro forces of the organisation.

Weakness: It is a broad analysis.

(3) BCG matrix

In order to plot and to differentiate the existing products/services in the waste crime market, one can use the BCG matrix.

The Boston Consultancy Group (BCG) matrix allows organisations to analyse the product/service lines in the market. This helps to allocate resources and is used as an analytical tool in brand marketing, product management, strategic management, and portfolio analysis. Thus, there are 2 axes i.e. relative market share and increasing market rate, allowing building 4 quadrants (see figure 6). Each quadrant corresponds to different types of business units/products/services.

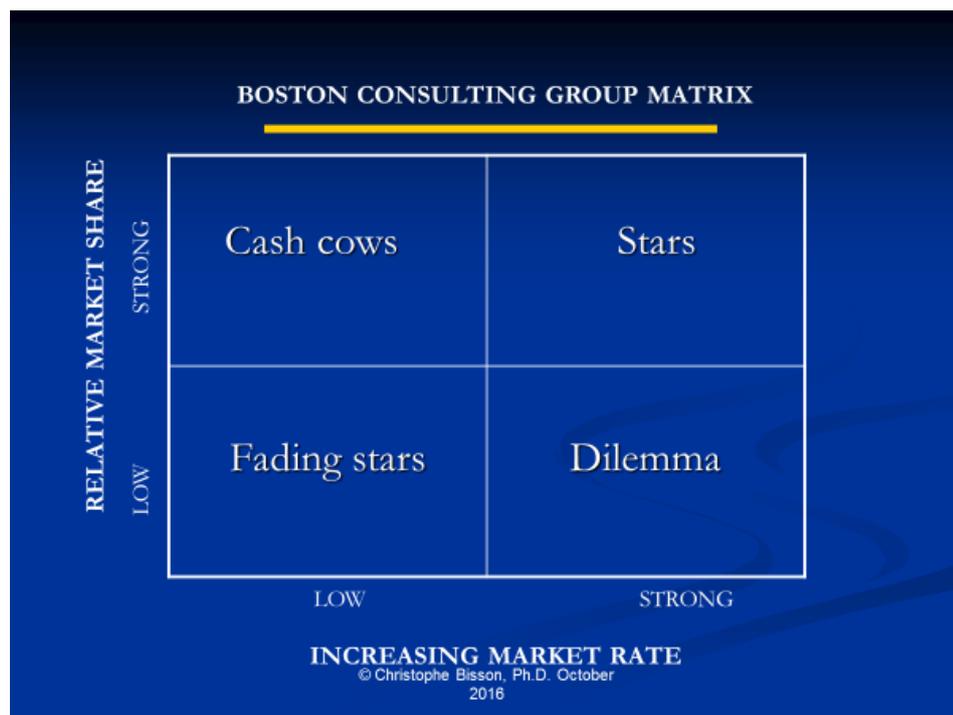


Figure 6 - BCG Matrix

Products/services of the waste crime market could be plotted to have a snapshot of the situation in the market (market share and market rate).

Strength: Very easy to use. Provides a snapshot of a market.

Weakness: Limited to market share and market rate which might be sometimes difficult to obtain.

(4) Profiling

In order to get deeper analysis of stakeholders, profiling can be used.

Profiling¹¹ of a criminal organisation i.e. Data/information are gathered according the following plan:

- **Basic data:** date of creation, company status, website address, contacts.
- **Business culture:** what is the mission of the company?
- **Financial data:** profit, turnover.
- **Long term objectives:** What is the vision of the company?
- **Location:** where is the headquarters based?
- **Products and services:** what are their product ranges?
- **Research and development:** what is the percentage of R&D of the company?
- **Marketing strategy:** how do they segment markets? What is their product, place, promotion and place strategies?
- **Employees:** How many employees and their profiles? who are the key employees?
- **Behaviours:** in the past, how decision makers reacted to some events? What drives the owners of the company?

Therefore profiling permits a deep understanding of one organisation (to **unveil for instance its weaknesses and strengths**) within the waste crime market.

Strength: Provides a detailed description of an organisation. A must for all organisations which are active in the waste crime market.

Weakness: It requires to be completed with techniques of each field (e.g. marketing such as product positioning).

(5) Benchmarking

Benchmarking is a process to compare an organisation's key metrics to other organisations which are the best for these metrics from the same sector or different ones (e.g. speed of operations, quality of services/products). It is often presented as table and would allow environmental regulators to **evaluate the threat levels of various actors, as well as to compare with other organisations which fight against waste crime.**

Strength: It widens perspective and helps organisations to improve themselves continuously.

Weakness: Contexts of performance might not be given which is a bias as some organisations might under or over perform due to temporary reasons for instance. It can create in some cases over confidence instead of helping to build a plan for optimising results. Thus, it needs to tell the story and the story needs to be reality checked and its consequences understood.

¹¹ See (Bisson, 2013)

(6) SWOT Analysis

SWOT Analysis is used to formulate a strategy by analysing inside Strengths, Weaknesses/ and outside Opportunities and Threats. It can be represented as 4 quadrants and applied for all major stakeholders of the waste crime market.

Strength: Very easy to use to build one's strategy.

Weakness: It guides analysts to deal with the big picture and not the details.

Additional CI techniques to detect the potential threats as a Strategic Early Warning Approach

(7) Industry/Product maturation

This is based on a life cycle (see figure 7 below). After the Emergence and Development stages, an industry or product passes into the Maturity stage. This third stage of the life cycle can be quite a challenging time for organisations, therefore as products for waste crime follow a similar path, environmental **regulators could anticipate the evolution of waste crime' types and related markets.**

Strength: Helps to forecast trends. Since it is simple, it is fast to implement.

Weakness: Accuracy is by far lower compared to time series.

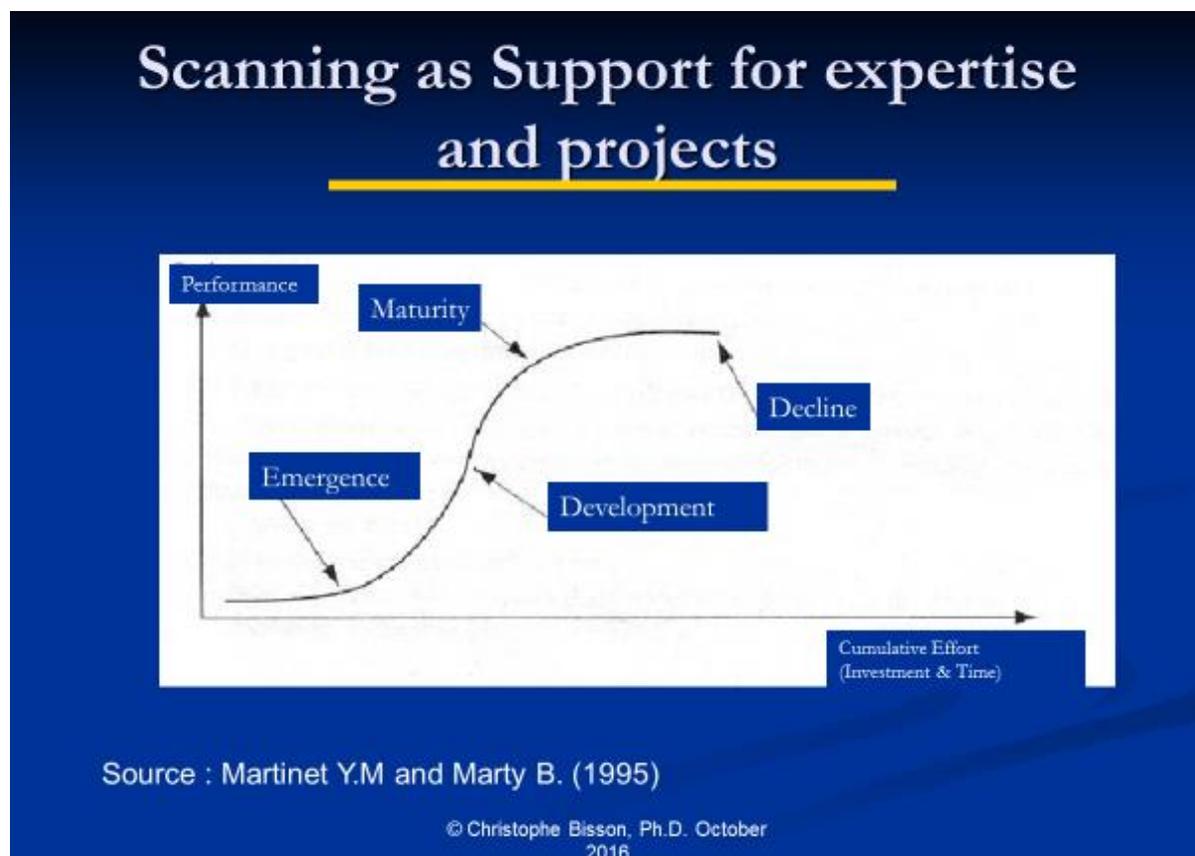


Figure 7 - The industry/product life cycle

(8) Future market size analysis

While forecasting techniques include qualitative methods such as seeking expert advice, the techniques suitable for market analysis require quantitative methods (provide numerical forecasts) suitable for an analytic approach. Effective mathematical forecasting (i.e. predictive analytics) looks at existing data and applies corrections or smoothing to predict future trends. The key inputs required for forecasting are the present situation, past data to determine past trends, selection of the sampling period for historical data and selection of the forecasting period¹². It could help to **forecast the waste crime market size**.

Strength: Provides good results with few variables and independent from other results sets.

Weakness: It does not work well for economics for instance where things are not stable and when many variables are required.

(9) Product/service positioning

Positioning techniques can be examined, to understand the gaps in the markets.

This helps identify **areas in the positioning map** (see figure 8) where the organisation's products or services could be the most competitive in the given targeted market. Hence, waste crime products could be plotted on a map with different representative axis, to **show the performance of these waste crime products/ services and detect potential movements or creation of new threats**.

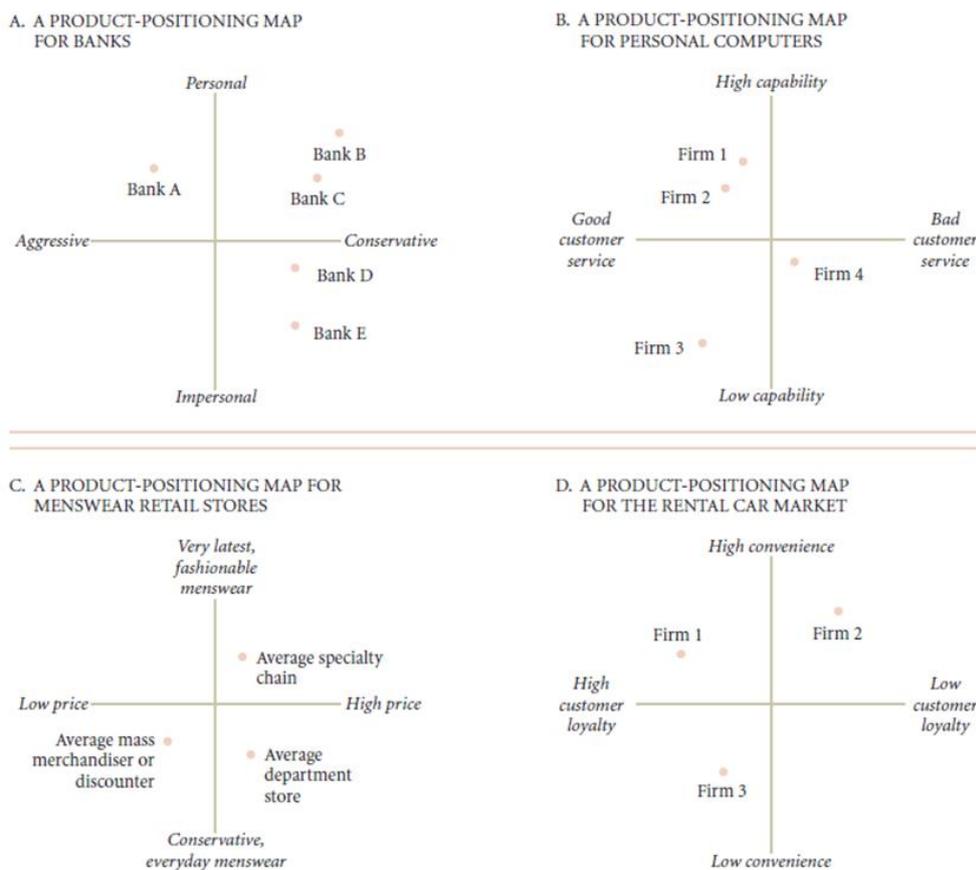


Figure 8 - Examples of product positioning maps

¹² See (Markgraf, 2016).

Strength: Provides a snapshot per waste crime market. Helps visualise the gaps in the market that might create opportunities for criminals.

Weakness: Limited to 2 variables. It may require several graphs for the same market to have a more complete understanding of the market.

(10) The 4 corners

Porter's four corners model¹³ is a predictive tool that could help in determining an organisation's course of waste crime actions.

Analysts must firstly explore what motivates an organisation and what are their actions.

a. Motivation – drivers

What drives the organisation? These drivers can be at various levels and dimensions and can provide insights into future goals. **For the waste crime market, it is the money.**

b. Motivation – management assumptions

The perceptions and assumptions the organisation has about itself and the waste crime market would shape its strategy. It deals with its perception of its strengths and weaknesses, culture and beliefs about its goals. For instance, what are the criminal organisation's assumption about the waste crime market, the risks and profits and its own capabilities?

c. Actions – strategy

The organisation's strategy defines how it acts in the market. Analysts explore what is the organisation actually doing and how successful is it in implementing its current strategy?

d. Actions – capabilities

Analysts need to look at an organisation's intrinsic ability to initiate or respond to external forces as it would help to predict actions that are might be taken by actors in the market. Though it might have the motivation and the drive to initiate a strategic action, its effectiveness is dependent on its capabilities. What are the strengths and weaknesses of the organisation? It can be used to determine **likely actions by organisations in response to public agencies' strategy such as SEPA. This can be useful when developing a strategy (e.g. for a new policy) or to test its strategy.**

Strength: A robust strategic tool to predict next actions of an organisation.

Weakness: Better done with a group of analysts that can brainstorm and complete the strategic profile of the organisation.

¹³ See (Porter, 1980)

(11) Scenarios

The **scenario** methodology requires a “social-reasoning process which utilises dialogue and conversation to share participants’ perceptions of the environment in a process of sense-making through theory building and storytelling”¹⁴. Yet, scenario analysis does not target prediction but instead “allows structured thinking on the future based on the evolution of aspects such as driving forces, trends, themes, events and cause effect logics”¹⁵.

There is a growing interest in scenario analysis. It combines inductive and deductive methods as scenarios appear step by step from data, and the scenario narrative is constructed by a top-down approach from the framework developed at the start¹⁶.

Therefore, scenarios¹⁷ are:

- Focusing on elements in the future that are unforeseeable (or difficult to foresee)
- Structuring presently existing knowledge in a systematic way
- Identifying plausible alternative futures
- Ability to contain discontinuities
- Ability to be both qualitative and quantitative

Thus, waste crime scenarios could be elaborated to be better prepared and widen the mental models of deciders to better detect the weak signals from scanning among other.

Strength: Prepare decision makers to better detect the weak signals and to render organisation more agile.

Weakness: It is impossible to foresee the future.

(12) War game

A **war game** is a dynamic strategic simulation, which aims to test scenarios or create plans as much as possible in real conditions and goes far further than brainstorming. According to the game, all the main stakeholders are represented by teams which are prepared for the game. After 2 or 3 rounds as different time frames, the organisation **strengthens its strategy, allowing for example simulation of consequences of some waste crime regulations.**

Strength: Prepare decision makers to better decide, anticipate threats and better act.

Weakness: It could lead to think a strategy as granted, and lead not to adapt decisions to market shifts.

¹⁴ (Wright and Goodwin; 2009, p. 817)

¹⁵ (Mahony; 2014, p.43).

¹⁶ (JRC-IPTS, 2008)

¹⁷ (Andersen and Rasmussen, 2014)