Economic Efficiency in Practice

8

The rational thing about man is the insights that he has. The irrational thing about man is that he does not act according to them.

Friedrich Dürrenmatt (1921–1990)

Opening Vignette

Isabelle Borduas and Kjell Hansen, her marketing manager, were discussing the new campaign that they were planning for Better Fashion Now!, the company Isabelle had founded 4 years previously. At the time, she had chosen the name to emphasise the label's style and quality, but, truth be told, over the last year she had become increasingly disenchanted with the industry. As she had told Kjell several times, she no longer felt that it was ethical to ask people to buy something, wear it a few times and then replace with something new. "We need to think differently," she had said in a meeting, "and we need a fresh approach."

The new approach was, even if she said so herself, innovative. Her idea was to buy used leather, preferably from developing countries, and use it to produce leather jackets. The jackets could then be bought or leased. If a customer bought a jacket, Better Fashion Now! would buy it back from the customer, take the jacket apart and use the leather to make a new jacket. "Each jacket will be unique!" she explained, "And nothing will go to waste. It's a perfect example of the circular economy."

Kjell put down his cup of organic coffee and spoke. "So, as we agreed, we'll do a trial run first here in Berlin. We have some great posters that we'll be putting up around town, the social media marketing plan is complete and ready to go, we've got a stand at Bread and Butter next year, we're placing a few advertisements in magazines. . ."

P. Eichhorn, I. Towers, *Principles of Management*, Springer Texts in Business and Economics, https://doi.org/10.1007/978-3-319-70902-4_8

He was interrupted by Isabelle. "Ok, very good, but. . . and it's a big but—all this costs money! How do you know all this marketing is going to work? How will you be able to say it's effective?"

"You remember we tested the posters and the messages with focus groups and got very positive feedback. It will be fine," Kjell said soothingly.

"You know what they used to say? They used to say, 'We know half of our advertising budget is effective, but we don't know which half!'"

"That was a long time ago, that was in the days of Mad Men. We're much more advanced now, we can do real time monitoring of what's happening online, and we can directly link people's responses to a marketing message to their actions."

"Well, OK," replied Isabelle somewhat grudgingly. "One thing I do know, though, is that we have a great slogan!"

"Oh yes," Kjell exclaimed. "I'm proud of it! Look, you can see it here." He reached into his portfolio case and pulled out a poster. "Better Fashion Now! Making fashion better", it said.

8.1 Procurement

8.1.1 Buy or Rent?

"Buy or rent?" is one of the fundamental questions to be answered during the procurement process. Normally, the payment streams connected with the alternatives that are under consideration are calculated and their respective present values determined and compared; all things being equal, the alternative with the highest present value is chosen. Factors that have an **effect on the result** of this calculation are correct estimates of operating lives, depreciation rates, rent or lease payments, and the cost of the capital if the purchase is to be self-financed or financed by a loan. In common usage, renting implies a short-term arrangement, while leasing implies a longer-term arrangement (e.g. renting a car vs. leasing a car). In some leases, the asset will (or can) become the property of the person who was leasing it. Under certain conditions there may be tax advantages if the asset is leased.

The method of depreciation is highly significant and there are various methods, generally based on the passage of time or on use, e.g. the straight-line depreciation, declining balance and units-of-production methods. Depreciation can be deducted from income for tax purposes and each country has its own rules about what can be depreciated, over which period of time and at which rates. For this reason, companies report their income before depreciation and amortisation in order to allow comparisons to be made; see Chap. 6 for more on EBITDA.

8.1.2 Economic Order Quantity

The economic order quantity represents that quantity at which the total purchasing costs (e.g. of the annual demand for a particular item) are minimised. Purchasing costs are composed of direct purchase costs (volume multiplied by purchase price),

indirect purchase costs (ordering costs—the fixed-costs for each order, e.g. communication and transport) and holding costs (e.g. costs of warehousing, insurance and interest). With an increasing order size, the number of actual orders declines, meaning that total ordering costs fall, but holding costs rise. The basic model for determining the economic order quantity is shown in Eq. (8.1), where *EOQ* is the economic order quantity in units, *D* is the annual demand in units, *S* is ordering costs and *H* is the holding cost per unit.

$$EOQ = \sqrt{\frac{2DS}{H}} \tag{8.1}$$

Equation 8.1 Economic order quantity

This calculation has some **simplifying assumptions**: a known and stable demand, a stable price, no limitations in terms of warehousing and financing, a constant level of fixed order costs, steady holding and interest costs as well as the possibility of replenishing stock directly after the consumption of the last unit, so that no minimum stock quantity is held. This basic model is only of limited use because these assumptions are not particularly realistic. A decision not to maintain minimum inventory levels should only be considered if the future is certain and the suppliers extremely reliable. The model excludes partial deliveries as well as deliberate or accidental loss and spoilage. It also ignores how purchase prices can vary according to the order quantity. Should any of the assumptions not hold, the result is a considerable increase in planning and calculation work.

8.1.3 Degree of Centralisation

Procurement can be centralised or decentralised; the choice between the two depends on which is the more economically efficient. The answer could be very easily found if the goal were simply to minimise costs. It is necessary to go beyond that and recognise that economic efficiency depends on the relationship between the benefits the procurement processes provide to an economic entity and what they cost. With centralised purchasing, purchasing processes pass through one purchasing organisation. When purchasing is decentralised—geographically or organisationally—multiple purchasing organisations exist. **Advantages of centralisation** are: economies of scale (ordering costs are spread over a larger order volume, resulting in volume discounts); uniform planning, controlling and monitoring; less complex production through the use of standardised material; lower levels of stock, meaning less capital is tied-up due to demand planning; more procurement specialists. Exaggerated centralisation, however, also leads to **disadvantages**: higher coordination costs; communication and cooperation efforts resulting from longer lines of authority; slow reaction times due to longer information channels when urgency is needed; increased transport costs if warehousing is also centralised. The advantages and disadvantages of centralisation

are mirrored by the disadvantages and advantages of decentralisation, so the latter need not be discussed here.

It is necessary to determine the pros and cons of the various possible degrees of centralisation in the form of benefits and costs in order to be able to calculate them using a static or dynamic method. If it is not possible or feasible to quantify and put a value on the advantages and disadvantages, **partial centralisation** can be a good solution. It involves having a central coordinating unit that, for instance, develops outline agreements for purchasing, puts out tenders and negotiates for particularly large or important purchases, while the decentralised purchasing units are responsible for less valuable purchases and must follow standards that have been set centrally.

Special Note Economic efficiency in procurement means having low-cost input factors of the right quality, in the right number, in the right place, at the right time. Adding ecological criteria results in **environmentally aware procurement** because suppliers have to deal with ecological issues, which can include such matters as pollutants, economic life, labelling requirements, environmental liability, environmentally friendly disposal as well as suppliers' take-back obligations. Conditions can be attached to just-in-time deliveries and the transport of hazardous goods in order to avoid negative external effects.

8.2 Transport

8.2.1 Optimal Location

Location choice plays an important role in enabling economically efficient transport because it allows journeys to be carried out cost-effectively. A simple location model with which the transport costs can be minimised is based on the following assumptions: all sites within a given area represent potential locations; transport costs are directly proportional to distance and not related to the type of goods to be transported; a straight line is used to measure distances.

These simplifications make it easier to calculate costs but do not correspond to reality. The assumption of that all sites represent possible locations is problematic; local regulations and restrictions, and the characteristics of goods often affect costs (e.g. transporting dangerous goods is more expensive than transporting clothes). Transport capacity (e.g. the size of load a lorry can transport) should also be included in deliberations. The consideration of such specific features is fundamentally possible, but requires complex models.

8.2.2 Minimisation of Transport Costs

Once the location has been selected, attention must be given to the minimisation of transport costs which essentially involves thinking about two questions. Firstly,

single routes, for example the delivery of goods from a central warehouse to individual customers (**travelling salesman problem**), and secondly, a larger number of routes and the allocation of individual delivery points to routes that are driven simultaneously (**vehicle routing problem**). It would be theoretically possible to include all the tour routes and determine the lowest cost solution, but since many delivery points could be allocated to multiple routes, a complete enumeration of possibilities is likely to uneconomic in terms of justifying the investment in time needed. In practice, heuristic methods are preferred as they provide solutions that are satisficing ("good enough").

In one method of travelling path optimisation—**the strategy of the next neighbour**—the point that is chosen as the next stop is the one which is closest. The method is simple to carry out, but its results are moderate because the degree of freedom shrinks as the end of the route approaches, meaning the most unfavourable paths have to be chosen. Other methods of optimisation exist, but their specialised nature means they are beyond the scope of this book.

Special Note Transport should be organised in a way which is—all at the same time if possible—cost-effective, safe, fast and punctual. It should also be convenient and should ensure nothing gets lost. Over and above these characteristics, **environmentally aware transport** pays attention to energy consumption and traffic pollution, to the external effects of transportation on earth, water, air and climate caused by corrosive, flammable and toxic materials, and to nuisances and threats to humans, animals and plants. These thoughts are behind the development of **green logistics**, where the concern is to measure and minimise ecological outcomes and impacts.

8.3 Inventory Management

8.3.1 ABC Analysis

Economically efficient inventory management is achieved in essence by ensuring that storage demand is determined as exactly as possible. Anything tangible may be stored—raw materials and consumables, replacement parts, semi-manufactured goods, intermediate and finished goods as well as components (in industrial companies), items for resale (e.g. in supermarkets). Since there can be so many different types and kinds of materials, they must be categorised according to their importance, which usually depends on their value. In an ABC analysis, **A items** are very important for the organisation, **B items** are still important, while **C items** are the least important. There are several breakdowns, and one of the most common ones is:

- A items—around 10% of items or 80% of total value
- B items—around 20% of items or 15% of total value
- C items—around 70% of items or 5% of total value

By dividing stocks into three groups in this way, it becomes possible to calculate economic efficiency. When planning the requirements for A items, a computer-controlled assessment of demand is carried out using bills of materials and a component-usage list. Due to the high value of the goods and the related high capital tie-up costs, emphasis is placed on accuracy. C items, however, are managed on the basis of their rate of consumption, which is done by studying past consumption figures and determining future requirements by using analytical time-series methods (as discussed in the previous chapter). This comparatively low level of accuracy is acceptable because of the relative lack of importance of C items; to achieve a higher degree of accuracy would not be efficient as it would take too long and cost too much and the extra accuracy would not be helpful. With B items, the aim is to have a level of accuracy between those of A items and C items.

8.3.2 XYZ Analysis

An XYZ analysis is structured similarly to an ABC analysis. In an XYZ analysis, the goods are categorised on the basis of forecast accuracy, which is relevant for the whole procurement process. The consumption of **X items** is relatively stable and is subject to only occasional fluctuations, which allows a high forecast accuracy. **Y items** allow a middling level of forecast accuracy; their consumption generally follows a pattern, but trends (in both directions) or seasonal fluctuations can occur. If consumption is irregular, forecasts become inaccurate; goods like this are **Z items**.

This analysis is also a precondition for being able to operate in an economically efficient way. If relatively stable consumption over time can be assumed, then relatively unchanging quantities can be procured at regular intervals. The trigger for ordering X items is then normally a fixed date. Z items, on the other hand, are ordered only if they are immediately required, which means a demand-related trigger. The start of procurement actions for Y items—the forecast for which is only of limited accuracy—is in many cases when inventory falls below a fixed critical value.

8.3.3 Sampling Analysis

The recording of inventory is mostly done physically, by counting, measuring or weighing, depending on the type of stock. If the relation between effort and purpose is disproportionate, i.e. if it would take too long or require too many people, then inventory quantities are determined by estimation or calculation, in other words, through a sampling analysis. The value of inventory is found in balance sheets, so the commercial laws of most countries specify when sampling is an approved way of recording inventory levels and how it should be carried out. For example, Article 241 Para. 1 of the German Commercial Code states that inventory can be recorded on the basis of sampling.

Stocktaking based on sampling is dependent on the level of information. Objects that are similar in type and price can be grouped together. A preliminary value, derived from the results of a previous full count (i.e. when every item was counted), can be calculated for each grouping. A differentiated approach is possible, where items with a high preliminary value are subject to a full count, while sampling is used for groupings of lower value to check the preliminary values.

Special Note As a rule, the aim of inventory models is to reach an optimal solution that takes into account the timing of stock replenishment, stock usage and the quantities involved. The models deal with factors like the costs of inventories (e.g. capital tie-up costs, insurance premiums), costs of storage space, warehouse administration and handling inventory items (e.g. reception, storage, relocation and release of stocks, ventilation, mixing, processing, preparing, screening, counting and packing). **Ecologically aware warehousing** considers in addition the external effects related to the warehousing of everything from parts to industrial waste, using the opportunity cost approach to focus in particular on land use and disposal site use. Further external effects that can be taken into account are the energy consumption of refrigerated warehouses and air conditioning, as well as any potential risks to nature and people from warehouse fires, toxic leaks from disposal sites and underground storage facilities, and radiation from nuclear waste (each ton of processed uranium fuel rods produces 600,000 tons of radioactive waste).

8.4 Manufacturing

8.4.1 Make or Buy?

This is a core question that can be asked about almost every single economic activity. The **history of economic life** shows that the answer to the question has varied at different points in time and in different locations. In-house production dominated the domestic economy of the ancient world and is nowadays found widely in developing countries. This form of production is favoured by some big firms and conglomerates and of course by people who like “do-it-yourself”. An interesting recent development is the maker movement, where individuals manufacture products (on a small scale, of course) using new technologies (e.g. 3D printers). The plans are usually open source, meaning that anyone can make the products using documentation provided by the original creator.

In recent years there has been a move towards using third parties, as the growth in outsourcing and contracting out demonstrates. Business entities do this to benefit from division of labour, specialisation, technical progress, increased flexibility, the ability to focus on their core competencies and, last but not least, lower costs.

The following issues must be considered: external production generates variable costs which depend on the quantities purchased from the external supplier. Internal production also generates variable costs, but in addition it generates fixed costs. The fixed costs associated with employees and the assets needed for operations are considerable and significant, because capacity (people or assets) can only be

reduced more slowly than the speed at which production levels decline. This leads to **cost stickiness**—costs that are resistant to change because of contractual agreements (e.g. commitments to buy a given amount to benefit from volume discounts) or technical characteristics.

Apart from the substitution of fixed costs by variable costs when changing from internal to external production, it is important to note that specialised suppliers can offer cheaper prices due to their **economies of scale**—as long as several companies outsource the same particular tasks. With external production and **just-in-time deliveries** manufacturing companies can largely dispense with warehousing. One consequence is that dependence upon the supplier increases, also bringing with it an increase in **transaction costs** for information, coordination, contracts and control as well as rising **transport costs** for outsourced production.

8.4.2 Optimal Lot Size

Lot size, *batch size* or *production lot* express the number of production units that can be worked on successively without retooling a machine. The optimal lot size is reached by minimising production costs, i.e. set-up costs on the one hand, and storage costs and interest charges on the other. Set-up costs result from a batch changeover and fixed ancillary costs are the set-up costs incurred for each reconfiguration of a machine and therefore for every individual production lot. The fewer the reconfigurations and the larger the production lots, the smaller the fixed ancillary costs per unit produced. On the other hand, storage costs and interest charges increase, the latter being due to capital being tied up in the resources. In order to determine the optimal lot size, the logic of the model of the economic order quantity is transferred to the area of production. A basic model is based on the following **premises**: continuous outward stock movement; no limitations in terms of warehousing, production and financing; a steady level of production, holding and interest costs; reconfiguration costs being unaffected by the order size (playing the same role as fixed order costs in the model of economic order quantity).

From a practical point of view, these premises are of only limited help since restrictions always apply to warehousing and financing. The assumption that the size of production lots is unlimited is also unrealistic. For practical purposes, an optimisation with constraints is of greater value, but although more sophisticated models are closer to reality, the efforts involved in their use become disproportionate and cast doubt on the economic efficiency of the procedure.

8.4.3 Capacity Utilisation

Capacity is the output potential of an entity, be it a firm, a municipal authority, a single machine or an individual worker. The ratio of actual output to design capacity gives the capacity utilisation rate as seen in Eq. (8.2).

$$Capacity\ utilisation\ rate = \frac{Actual\ output}{Design\ capacity} \times 100 \tag{8.2}$$

Equation 8.2 Capacity utilisation rate

The design capacity is the possible output; it is the maximum performance given any relevant technical or personnel limitations. Working for too long at the design capacity can lead to higher costs, because this can result in a larger volume of rejects, faulty products and complaints, increased conflicts and unplanned down time. The design capacity is in any case only achievable for a short duration of time. Instead of producing the maximum output, it is preferable to produce at a rate that can be sustained over the long term, which is the effective or optimal capacity. The capacity utilisation ratio is the ratio between used and usable capacity, shown in Eq. (8.3).

$$Capacity\ ratio = \frac{Capacity\ used}{Design\ capacity} \times 100 \tag{8.3}$$

Equation 8.3 Capacity utilisation ratio

The optimal operating level is often viewed as a cost-effective operating level; in other words, it is reached by aiming for minimal costs for a given output, defined in terms of quantity and quality.

The **cost structure** of a company is determined by its fixed and variable costs. **Fixed costs** are independent of the activity level. The provision of capacity brings with itself considerable fixed costs for staff, capital and material, so capacity must match objectives. Fixed costs are incurred for the potential output and do not change, no matter what the actual utilisation of capacities might be. Used capacity costs are the costs that result from the capacity that is actually being utilised; idle capacity costs represent the difference between fixed costs and used capacity costs. Capacity is being utilised optimally when fixed costs and used capacity costs are identical. For example, even the simple provision of vehicles for the fire brigade can bring about an optimal capacity utilisation in regards to the operational objective of safety. When these vehicles are actually employed for fire-fighting, their idle capacity costs are replaced by used capacity costs.

Variable costs depend on the operating level. The relation between the two can be proportional (costs change in relation to the operating level), progressive (costs increase proportionally more than does the operating level), degressive (costs rise with the operating level in absolute terms, but not to the same degree) or regressive (costs sink in absolute terms in spite of rising operating levels).

It is possible that a firm has no other option but to move away from having costs at the optimal level, such as when it is temporarily overextended in terms of production, but not to an extent that can justify an investment in new capacities. In this case, different **possibilities of adaptation** to different operating levels are

possible. Open to adjustment are one or more of the following: the quantities produced (overall or particular items), the capacity utilisation rate (intensity) and the hours of operation (time).

Industry 4.0 refers to the growing links between automation and data exchange in production processes. Machines are being provided with ever more computing power and the ability to communicate with other machines, leading to the development of the **internet of things**. These developments are going to make production cheaper, but raise a question: who or what will produce? Will it be people or machines and software?

Special Note Economically efficient production is very often linked to cost-cutting measures, such as substituting one input with another, searching for alternative production processes and less vertical integration. Layoffs of workers are not uncommon in this regard, and these have social costs that are borne by the state, the community and the laid-off workers and their families. **Environmentally aware manufacturing** goes further by ensuring that the resources employed are environmentally sound and that production processes are low in negative by-products and high in recycling potential, with internal and external processes being part of closed systems that contribute to the circular economy as illustrated in Fig. 8.1.

Disposal is closely connected with the production process. It involves the recovery, the recycling and the disposal of waste and other negative by-products from products such as vehicles, furniture, computers and clothing. A waste disposal market, with private and public companies (recycling companies, waste transport companies, incineration plants, sewage treatment plants, second-hand shops etc.), has grown up alongside the sales market. **Environmentally sound disposal** emphasises a waste management that is at all stages, from collection to recycling and disposal, safe and secure for the environment and for people, from collection to recycling and disposal. Figure 8.2 shows options for the recovery and recycling of waste.

8.5 Administration

8.5.1 Rationalisation

Administration is **an operational function, being office work in the service of other functions** (procurement, transport, warehousing, production, human resource management, marketing and so on). Of necessity, administration involves the factors of production. Administration is made visible by the clerical activities necessary to administer something—managing files, making assessments, documenting, archiving, gathering statistics and financial data, and much more. At the point where the goal of administrative activities is not just to provide services—i.e. be a means to an end—but is to be the end itself, operational administration turns into operational management, which has its own goals and decisions to be made; property management is not identical with property administration (Chap. 9 discusses management).

Administrative services in a company are hard to measure and it is difficult to allocate them to individual tasks, areas, divisions or products. From the point of

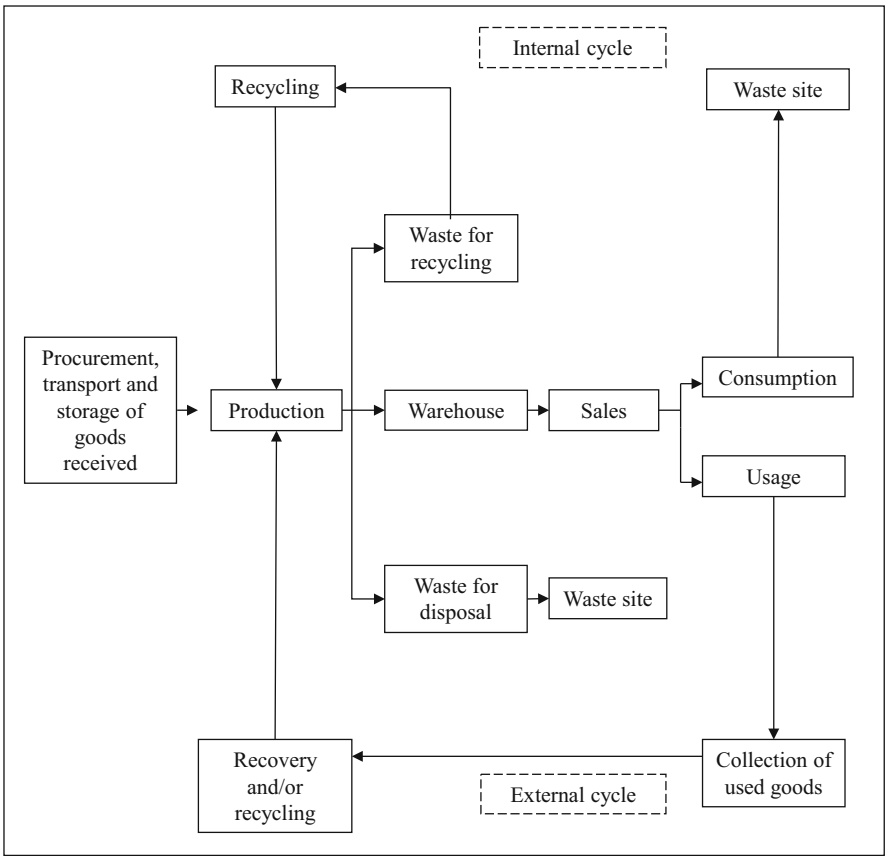

Fig. 8.1 The circular economy

view of costs and economic efficiency, the costs of administrative services represent overhead costs. Unlike overheads that are related to production, **administrative overheads** are mostly fixed as undifferentiated sums—the difficulties just mentioned make this the best solution from an accounting point of view. However, attention is being increasingly paid to the size of these overheads, leading to the introduction of measures to reduce costs further and/or increase output further: this is no more or less than the rationalisation of administrative work.

Overhead-value analysis records and evaluates the costs and benefits of administrative services in a systematic process that examines how fit the services are for the purposes they are intended to serve. In practice, a project team is established, made up of senior management and consultants, and it tries to determine where costs can be saved. Crucial questions are: Who provides which administrative service to whom and why? Can the recipient of the services wholly or partially do without them? Are there more cost-effective alternatives like redesigning processes to be more efficient or even outsourcing? This analysis frequently leads to recommendations to reduce costs by eliminating unnecessary services.

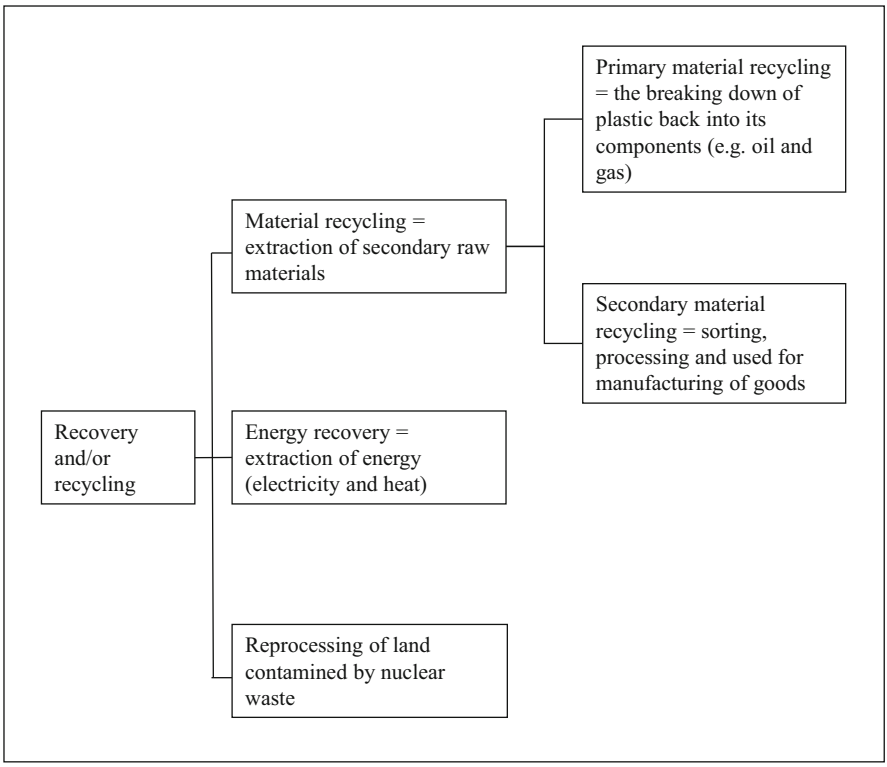

Fig. 8.2 Recovery and/or recycling of waste

Zero-based budgeting (ZBB) is a rolling process that begins with the selection of the functional areas to which it is to be applied. Once chosen, the activities in the functional area are analysed, the first time in depth, subsequently on a rolling basis, to determine needs and costs. This method, originally conceived for the administrative departments of companies concerned about high sales, general and administrative (SG&A) costs, aims to redirect resources from less important to more important activities. Traditionally, the budgets of administrative units for the next financial year are based on the previous year's budget—employees often make an extra effort to make sure that they have used up all the budget that was allocated to them before the end of the year, being afraid that the following year's budget will be reduced if not everything has been spent. Under ZBB the starting point is zero—all activities have to be justified, and activities are ranked by priority; the probable costs for the services to be provided must of course be known. The individual administrative units and their activities are gradually, based on priority, included into the overall budget until its limit is reached. The advantage of ZBB is that it prevents uncontrolled increases in administrative costs. As experience shows, however, administrative units develop a certain momentum of their own once they have been established, and their fixed costs cannot be reduced overnight. A further problem is that zero-based budgeting does not take sufficiently into account

the benefits of synergies between the individual units but instead only considers the performance levels of individual administrative units in isolation.

8.5.2 Communication

The physiocrats—a group of eighteenth century French economists—were of the opinion that productivity only existed in agriculture and forestry. Industrialisation in the nineteenth century put an end to this view, and to this day this ratio of input to output is generally still only used in connection with the production of goods. In fact, the **greatest advances in productivity** are now to be found in the administrative activities of economic entities in all sectors, and particularly in the service industries. The key concept here is communication. Administrative work can be done more efficiently and effectively by taking advantages of the possibilities that technology offers. Accurate and comprehensive information can now be acquired rapidly and securely, processed, assessed and disseminated; if well implemented and integrated into processes, all this means that administrative work can be done more efficiently and effectively. The flow of information moves much more quickly, and distance is no longer a barrier to communication within the company, and between the organisation and its environment. The global availability of data and the establishment of service providers in all parts of the world have led many organisations to outsource administrative activities, allowing them to focus on their core competencies. Human relations departments alone provide examples of what can be outsourced: recruiting, payroll, and training, for example. One of the first areas of activity that is outsourced is often the one that provides the infrastructure that makes the outsourcing of administrative activities possible—information systems. A comparison of administrative work before and after the development and use of modern communications technology shows a clear increase in economic efficiency. This trend is going to continue as more and more algorithms are introduced into administrative processes. Many expect that algorithms will have the capability of performing many of the tasks that today are carried out by humans, meaning that there will be huge changes in the ways economic entities work.

Special Note Administration, as so far discussed in this chapter, is a function within a company that carries out office work related to management functions (planning, organisation and supervision), operational functions (administration of procurement, warehousing, research facilities, marketing etc.) or the use of factors of production (human resources and finance administration, accounting, facility management). **Environmentally aware administration** can improve the environment in offices in many ways. Environmentally friendly electronic equipment can be used (printers which emit fewer pollutants and are quieter, monitors and computers that save energy), office material reused (refilling laser printer toner cartridges), recycled paper used (manufactured from waste paper using up to 90% less water compared to normal paper), the number of documents printed reduced, electronic waste reduced (as a result of take-back obligations and recycling) and so on.

8.6 Marketing

8.6.1 Optimal Marketing Mix

The optimal marketing mix is the right combination of the four marketing instruments (the four Ps—product, price, place (distribution) and promotion) at a given point in time. When making the relevant decisions, it is firstly necessary to achieve the most cost-effective relationship between **information value and the transaction costs** of obtaining, processing, assessing and disseminating the information. The remaining budget is then distributed among the marketing instruments in order to reach an **optimal allocation**. A prerequisite of an optimal mix is that there must be substitutability of the components, at least within certain limits, since a search for realistic new combinations would otherwise not be possible. Theoretically, a marketing budget could be divided up in such a way that the marginal benefits of the individual instruments are balanced (see Chap. 2). Even if this model is too theoretical for practical purposes, this way of thinking can help decision makers to make an economic whole out of individual parts.

8.6.2 Evaluating Advertising Effectiveness

A vital issue in marketing is trying to understand how worthwhile advertising is, given what it costs. Quantitative goals include turnover, market share and profit, while qualitative goals include awareness and attitude. One example of the evaluation of **quantitative advertising goals** is to use experimental methods to find the number of orders that were influenced by an advertisement. A further possibility is regression analysis; the dependent and independent variable refer in the static approach to a single period, in the dynamic approach to several periods (see Sects. 7.2 and 7.3). An example for the dependent variable is units sold, for the independent variable advertising expense. There is the danger that a causality is assumed that in reality does not exist in such a form; sales are not exclusively dependent on advertising, i.e. on the promotion policy, but on all the marketing instruments—correlation does not imply causation. Because of this difficulty, the measuring of **qualitative advertisement goals** may be preferred. Recall, recognition and attitude can all be measured in order to determine the extent to which goals have been achieved. However, problems also arise here. Memory may only be loosely connected with purchase acts. For instance, humorous advertising can produce a high degree of awareness without resulting in higher sales. There is a similar issue with measuring attitudes—even if the customer has a positive predisposition towards a product, it does not necessarily result in a purchase.

Special Note
Marketing tries to activate and satisfy the needs of existing and potential customers. **Environmentally aware marketing**, often called green marketing, has additional tasks. It emphasises that having environmentally compatible production and products helps generate sales. Marketing instruments are chosen that support the

environmental goals of resource preservation, reduction of pollution and non-harmful waste disposal. **Green marketing** is also used to promote indirect product advantages (e.g. campaigns to promote travelling by tram can refer to their low energy consumption as well as their time saving advantages compared to cars) and so influence the attitude to the environment of those being addressed.

The four marketing instruments can reflect the producer's attitude and behaviour towards the environment. **Product policy** guidelines might mandate that the company offers environmentally friendly goods in each market in which it is active—a processed food company would also offer organic food products, car manufacturers would also offer electric vehicles, and so on. **Price policy** can consider price differentiation and delivery conditions based on environmental issues, while core to **distribution** can be an environmentally sound choice of location, regional suppliers, regional sales and reusable packaging. Finally, **communication policy** can place importance on showing environmental guidelines and publishing environmental reports and environmental balance sheets. The employment of marketing instruments in this way and the resulting marketing mix enable companies to differentiate themselves from their competitors. Doing so should in our opinion be a *sine qua non* not only for individual business entities but also for the entire economy.

8.7 Examples and Exercises

8.7.1 ABC Analysis

Situation
Gartengrün AG manufactures lawn mowers and various gardening tools. A variety of different materials are used in the production process.

The company would like to use an ABC analysis to classify the various materials used and to find indications for efficient material management and order quantity planning. The following material list has been produced:

No.	Annual consumption (units)	Price per unit (€)
1	120	280.00
2	15,000	1.70
3	1000	2.70
4	4000	1.80
5	600	5.80
6	30,000	0.08
7	18,000	0.05
8	20,000	0.08
9	500	8.50
10	100	23.00

In carrying out the ABC analysis it can be assumed that the A items are worth 70% of the total value, B items 18% and C items 12%.

Solution

No.	Annual consumption (units)	Price per unit (€)	Annual consumption (€)	Share of value (%)	Share of quantity (%)
1	120	280.00	33,600	40.0	0.1
2	15,000	1.70	25,500	30.4	16.8
3	1000	2.70	2700	3.2	1.1
4	4000	1.80	7200	8.6	4.5
5	600	5.80	3480	4.1	0.7
6	30,000	0.08	2400	2.9	33.5
7	18,000	0.05	900	1.1	20.2
8	20,000	0.08	1600	1.9	22.4
9	500	8.50	4250	5.1	0.6
10	100	23.00	2300	2.7	0.1
	$\sum = 89{,}320$		$\sum = 83{,}930$	100	100

Class	Number of items	Percentage of total units (%)	Percentage of total value (%)
A	2 (No. 1 + 2)	20	70.4
B	3 (No. 4 + 9 + 5)	30	17.8
C	5 (No. 3 + 6 + 7 + 8 + 10)	50	11.8
Total	10	100	100

The results of the ABC analysis indicate that most effort should be put into managing items 1 and 2, which represent 70% of total value. A rule of thumb is that the percentage of time that is spent on optimisation of inventory management should be the same as the percentage of total value that the class represents. In this case, the managers should spend 70% of the time they are spending on this activity on these two items. By the same token, they should only spend around one-tenth of their time on the Class C items.

8.7.2 Make or Buy?

Situation

Pascale and Geneviève have decided to open a muffin shop; muffins have become trendy and that want to get into the market quickly. They are in the process of writing their business plan and must make a fundamental decision—buy or make? Should they bake the muffins themselves on their own premises or outsource their production to a local bakery?

If they buy the products in, they will need some special containers that will keep the muffins fresh. The containers only last for 1 year and would cost 500 € per year.

The muffins from the bakery will cost 0.80 € each. If they make the muffins themselves they will need a small kitchen, which with all the necessary equipment, will cost 10,000 €, and each muffin will cost them 0.20 € to make. They expect to sell 20,000 muffins per year.

Should they make or buy?

Solution

The most straightforward way to find the answer is to determine the total costs using the following formula, where TC = total costs, FC = fixed costs, VC = variable costs and Q = quantity.

$$TC = FC + (VC \times Q)$$

The total costs of outsourcing production are shown in the next equation:

$$500\,€ + (0.80\,€ \times 20{,}000) = 16{,}500\,€$$

Inhouse production has the following costs:

$$10{,}000\,€ + (0.20\,€ \times 20{,}000) = 14{,}000\,€$$

It clearly makes sense for them to produce the muffins themselves. Numbers are, however, not the only consideration in such decisions. If outsourcing were cheaper, Pascale and Geneviève would have needed to ask themselves if their shop would be as popular if they did not make their own muffins. The answer to that question is probably 'No', so they would need to a wider view before reaching a decision.

The following equation allows the point of indifference to be found, i.e. the quantity where the costs of inhouse and outsourced production are the same.

$$FC_{Buy} + \left(VC_{Buy} \times Q\right) = FC_{Make} + (VC_{Make} \times Q)$$

This gives

$$500\,€ + (0.80\,€ \times Q) = 10{,}000\,€ + (0.20\,€ \times Q)$$

$$Q = 15,833\,€$$

8.7.3 Economic Order Quantity

Situation

Mein Haus und Garten is a large regional supplier of building and garden materials to the trade and hobbyists. Among the items it sells is topsoil, used for borders and beds. For each of the past 3 years it has sold an average of 1500 tonnes and demand is fairly constant over the year. Edyta Mirnik, the new procurement manager has

been reviewing procurement policies and found that there was little planning, so she has decided to improve this area. She estimates that the cost of placing an order is 30 €, and that the holding costs are 20% of the purchase price, which is 50 € per tonne. What is the economic order quantity?

Solution
Using the formula presented earlier in the chapter, where D is the annual demand in units, S is ordering costs and H is the holding cost per unit,

$$EOQ = \sqrt{\frac{2DS}{H}}$$

We find

$$EOQ = \sqrt{\frac{2 \times 1500 \times 30}{0.2 \times 50}} = 94.868$$

Edyta should therefore order 95 tonnes per order.

One of her goals is to reduce holding costs by 50%. What difference would this make?

$$EOQ = \sqrt{\frac{2 \times 1500 \times 30}{0.1 \times 50}} = 134.164$$

If she can order 135 tonnes each time, she may be in a better position to get a volume discount.

8.7.4 Evaluating Marketing

Situation
Hampton Mayhew, a small private bank sent out 5000 letters to potential clients. The letters were printed on expensive paper and had been designed to give the impression of stability, reliability and understated competence. Included with each letter was a small high-quality pocket calculator. The letters were sent to people all over Europe with a net worth of over 5 million euros. The total cost of this campaign was 350,000 € (including the letters and follow up calls and visits). Alex Kendall, the director of marketing, has been provided with the following summary of the results, 1 month after the campaign ended:

- 150 people indicated that they would like to see a bank representative. 30 of them opened an account
- 180 people provided their contact details and indicated they would like to be contacted again within the next year

- 90 people indicated that they wanted further written details. Follow-up calls and/or visits were made to them, and 15 of them opened an account.

What should Alex say to the board when asked about the campaign?

Solution
At first glance, the fact that only 45 people have so far opened an account, when a grand total of 5000 potential customers were contacted, seems disappointing—it means there was a conversion rate of 45 ÷ 5000, i.e. less than 1%. The campaign cost 350,000 €, so the cost of acquiring each new customer was 350,000 € ÷ 45, i.e. 7777 €.

Alex is not particularly concerned. He will first argue that the lifetime profit that the bank makes from each customer will be much more than 7777 €. Second, he will make the point that the money the new customers put in the bank is a useful source of capital that the bank can use for its own investments. Third, he will emphasise that the decision-making process regarding which bank to use is a much longer one that the decision-making process about which refrigerator to buy and that he therefore expects at least 30 of the 180 potential customers who wanted to be contacted later to open an account. This argument is based on the ratio of people who opened accounts after a follow-up call or visit. The cost of acquiring each new customer would then be 350,000 € ÷ 75, i.e. 4667 €.

Despite his confidence, though, he would not be surprised if he were told to achieve the same results more cheaply next time.

8.7.5 MyCompany Project

Your café has been going so well that you will be able to open a second branch, located some 5 km from the other one. The new café is 50% bigger than the other one, and you plan to expand the range of food on offer. You will be hiring a manager for the new café. Now that your will be selling more coffee, you are giving some thought to procurement and inventory management.

- How would you organise procurement? Will you do the procurement for both branches, or will you let the new branch manager do her own procurement? What are the arguments for and against each alternative?
- How will you check the quantities you have in your storeroom? Would you count each milk carton to make sure that you have the quantity of milk you expect to have? How often would you check the number of coffee cups you have?

A significant decision needs to be made about the food offering in the new branch. You are expanding the menu, and need to think about whether you and your employees are going to prepare the food, or whether you are going to buy from one of the many outside companies that can provide vegan food.

- How would you approach this problem? What criteria will you consider when deciding what to do?

As the owner of cafes serving vegan and organic food and drinks, you feel that there is an expectation that you do your part for the natural environment. You have read about the circular economy and find the concept very interesting.

- What can you and your cafes do to become part of the circular economy? Why would you take these actions?

The final issue on your mind is your marketing budget. Your marketing has so far been low key, but now you intend to spend more. You expect that you will do online and social media marketing.

- How will you know if you are getting value for money from your marketing budget?

8.7.6 Self-Test Questions

– *What influences the decision to buy or rent?*
– *What are the underlying assumptions of the basic model of economic order quantity?*
– *What are the advantages and disadvantages of a low degree of centralisation of procurement?*
– *What does a simple model of optimal location consist of?*
– *What are A items, B items and C items?*
– *What aspects must be considered in environmentally aware warehousing?*
– *What is meant by cost lag?*
– *On what assumptions is the basic model of the optimal lot size based and to what extent are they problematic?*
– *What is the level of activity?*
– *Which factors determine cost structure?*
– *What recycling and recovery alternatives exist for industrial waste?*
– *What are administrative overheads?*
– *How is the method of zero-based budgeting carried out?*