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Solutions Manual for Operations and Process Management 7th Slack

SOLUTIONS MANUAL SAMPLE PREVIEW

PUBLISHER

Pearson

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2024

RESOURCE TYPE

Solutions Manual

ISBN

9781292461052

Instructor's Manual

Operations and Process Management

Seventh edition

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Fourth edition published 2016
Fifth edition published 2018
Sixth edition published 2021
This edition published 2024

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Teaching Guides for Operations and Process Management, 7th Edition

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The instructors' manual for this edition of *Operations and Process Management* is a little different to those for previous editions. As well as generally updating the manual to reflect the changes we have made to the content and (especially) the examples and cases in the text, we have made two particularly significant changes.

Responsible operations

The first is the introduction of a new (to this book) feature in each chapter – 'Responsible operations'. This summarises how the topic covered in the chapter touches upon one or more important social, ethical and environmental issues. To help make use of these features, we have included in some of the chapters' teaching notes suggestions of how the feature might be used in a class setting.

First, however, it is helpful to establish exactly why a responsible operations perspective is being taken. There are several reasons.

- *Responsible issues are clearly important and urgent.*
- *Operations practice directly impacts responsible performance.*
- And, vice versa, responsibility impacts what is operationally acceptable.
- *Investors are taking increasing notice of responsible performance through ESG (environmental, societal and governance) investment criteria.*
- *Our students are increasingly committed to responsible performance.*

Not every chapter's teaching note has a 'Responsible operations' exercise, but there are enough of them to give an idea of how we use exercises of this type. When using this type of exercise, remember that many 'responsible operations' issues do not have a definitively 'correct' answer as such – they are often there to provoke discussion. The key issue is to establish the relationship between the topic of the chapter and responsible practice.

In treating the relationship between operations practice and responsibility, one must decide how much weight to give the topic. Discussing this with educators, there seem to be two 'extremes', with most falling somewhere in between. At one extreme is a response to this question from one colleague, *I always start my course with an Ocean scientist talking about the reality of global warming. It sensitizes students to environmental issues,* at the other extreme is a response of*, No, I try not to get into all that [sustainability]. It only detracts from 'core' OM issues and techniques.*

A related issue is should we always include 'counterviews' to our personal stance? For example, while the orthodoxy as represented in the text supports including responsibility issues in OM teaching, a counterview comes from Milton Freeman of Chicago University who (famously) said *the business of business is business.* He believed that companies that focus on social responsibility instead of profit were bound to fail in the long run.

Go beyond the bots in applying the principles

The second change affects the 'Applying the principles' questions towards the end of each chapter. It certainly cannot have escaped any educator's notice that generative artificial intelligence (AI) models, such as Chatgpt, have developed significantly. They can now tackle most of the questions with a reasonable degree of accuracy. So what should textbook authors do? Options include:

- Ignore the issue and change nothing? [No. It's an important issue and it won't go away.]
- Abandon the whole idea of having any questions? [Could do. And it would make print versions of the book thinner. But there still can be learning value in considering these types of questions, so it would be a loss to dump them.]
- Try to make the questions AI-proof? [One can only do this to a limited extent. For example, most AI models are trained on sources dominated by US-sourced information, so using only European and Asian examples and models can make 'life' difficult for them, but only to a limited extent. Also, who knows how capable these models will be before the next edition?]
- Embrace AI? [Almost certainly the only long-term way forward. And to some extent what we have chosen to do.]

So, we have modified the 'Applying the principles' sections in two ways. First, we have limited the number of questions to four per chapter, choosing four that allow for some degree of creativity on the students' part (and modifying the wording where necessary). Second, we have introduced the questions by encouraging students to critique the 'answers' that are given by whatever AI model they are using. In the sections now called, *Go beyond the bots in applying the principles,* we exhort students to not accept any AI-generated answer, rather to critique it. What might the AI-generated 'answer' have forgotten? Are the assumptions it is using valid? Would the suggested 'answer' be valid for all types of operation? What more can you add to the AI analysis?

However, many students might appreciate more guidance on what 'critique' could mean in this context.

Critiquing AI-generated 'answers'

The first point to stress to students is that 'critique' is not the same as 'criticism', (at least in English, in some other languages there is less, or no, distinction between the two words). In English, 'criticism' is a process that attempts to find fault with a solution or 'answer'. It is negative in the sense that it intends to demonstrate logical gaps, mistakes and errors. It is intended to promote an unfavourable view of a case, or point of view. By contrast, here we use the term 'critique' to mean a structured, detailed and analytical evaluation of the (in this case) AI-generated

'answer'. It attempts a more 'balanced' view of the answer. It is intended to improve, expand and add meaning to an answer, rather than demolish it.

So, how could students be encouraged to critique AI-generated answers? There are many ways of approaching this, but here is one way that works for OM questions and answers. (Err, please feel free to critique it.)

Questions to ask about the suggested AI answer	What assumptions (if any) does the answer make?	How might the answer change if those assumptions do not apply?
Type of operation?		
Operating environment?		
Strategic objectives?		
Practicality?		
Risks?		

First there are some obvious questions to ask about the assumptions the AI-generated answer is using. See the matrix above.

- **What type of operation is the answer assuming?** Is it service or manufacturing? Large or small? Level of a complex supply network or a simple process? Exclusively applies to the operations function or applies to all functions' operation's resources? B2B or B2C? For-profit or non-profit? Level of volume, variety, variation and visibility? [Both the 4Vs and IHIP scales could be useful here.]

- **What operating environment is the answer assuming for the operation?** Does it assume a steady-state, stable and predictable environment, or unstable, impermanent and transient conditions? Does it assume slow-moving stable markets and competitors, or a fast-moving market with threatening 'disrupter' competitors? Does the operation have to work within a free market, or one subject to government regulations? [PESTLE – Political, Economic, Sociological, Technological, Legal and Environmental – analysis could be useful here.]

- **What strategic objectives is the answer assuming for the operation?** Is it assuming that cost is the priority? Or product or service quality? Or delivery speed or reliability? Or range of products/services? Or product or service innovation? Or social welfare? Or surviving in the short-term or building long-term capabilities? Or minimising capital spend? The answer may be, 'all of them to a limited extent'. But what is their relative priority and what trade-offs are implied?

- **How practical is any proposed solution implied by the answer?** Does implementation depend on particular levels of operational capacity, or skills, or finance, or culture, or relationship with other enterprises, or technology, or experience, or knowledge?

- **What risks does the answer imply? What might go wrong if it is implemented?** How likely is it to go wrong? If things do go wrong, what would be the impact on customers, staff, finances, the environment, society, reputation, suppliers, any other stakeholders? What could be done to prevent things going wrong? How might the effects of any impact be mitigated? How might the operation recover from anything going wrong?

Even more important than identifying all these aspects of an answer and its assumptions is to thoroughly consider their relevance when other assumptions apply. Does the answer hold true for all types of operation? Under all operating environments? No matter what strategic priorities apply? Irrespective of possible resource limitations regarding their practicality? And irrespective of the operation's attitude to risk?

Approached in this (or some similar) way, AI-generated answers are no threat to student learning, they are really a great opportunity to push them to levels of understanding well beyond simply regurgitating a 'copy and paste' answer.

Teaching Guide

CHAPTER 1

Operations and process management

Introduction

Teaching the material in Chapter 1 of the book is both the most important and the most difficult part of teaching an operations (or operations *and process*) management course. Most important because it is vital that students develop an enthusiasm for the subject and this is best attempted early in the course. Difficult because one has to establish some key principles before the 'building blocks' of the subject have been taught. We have found it useful always to work from whatever experience the students have. For post-experience students like MBAs this should not be too difficult. One can always ask them to describe the nature of operations in the companies they have worked for. One can even explore some of the prejudices they might hold about operations management (dull, obstructive, always screwing things up, etc.) and base discussions on that. Alternatively, and certainly for students who have less experience, one can ask them about recent experiences as a customer (both good and bad) and base a discussion on the importance of operations management around those experiences.

Key teaching objectives

- To enthuse students with the 'hands-on' excitement that can be gained from an understanding of operations management *(I want to prevent you ever enjoying a theatre performance, restaurant meal, or shopping experience ever again. I want you continually to be looking for the operations implications of every operation you enter. You are going to be turned into sad people who cannot go anywhere without thinking of how you could improve the process*).

- To convince students that all organisations really do have an operations function, therefore operations management is relevant to every organisation.

- To convince students that all managers are operations managers because all managers manage processes to produce outputs. (*Even marketing managers are operations managers. What you learn as marketing in business school is really the 'technical' side of marketing. Of course this is important, but marketing managers also have to produce marketing reports and information, without mistakes in them, on time, relatively quickly, flexibly enough to contain the latest information, and without using an army of marketing analysts to do so. In other words, they are producing services for internal customers*).

- To introduce the three key ideas in the chapter, namely,

    a) Operations and process managers manage transformation processes at three levels: the level of the supply network; the level of the operation itself (or 'the organisation' if that is more understandable to students); the level of the individual process (some of which will be within the operations function, and the rest of which will be in other functions).

b) Operations and processes differ in terms of their volume, variety, variation and visibility (the four Vs).

c) Operations and process managers must perform four sets of activities to ensure that their operations and processes contribute to overall strategic impact –*Direct* operations strategy, *Design* operations and processes, *Deliver* products and services by planning and controlling operations and process, *Develop* the performance and capability of operations and processes.

Exercises/discussion points

Exercise – The four Vs dimensions of operations can be used for many types of exercise. For example, one could ask different groups to identify different types of restaurant, food retailer, car servicing operation, cinema, club or pub, etc., and plot the 'similar but different' operations on the four dimensions. Alternatively, many television programmes can be recorded off-air which illustrate operations. These often look 'behind the scenes' of well-known operations such as airports. Any of these could be used to promote group discussions on what operations management might be like in such operations and especially the differences (in terms of the 4 Vs) between the processes shown.

Exercise – For residential courses, especially of post-experience students, an evening could be spent 'on the town', where syndicates are required to sample the services of a restaurant, a retail operation and an entertainment operation, and report back the following morning. This is a great way of giving participants a change of scene on the Thursday of a one-week course.

Exercise – Perhaps one of the most important points to get across in any introductory session is the ubiquity of operations and process management. MBAs in particular need convincing that the subject is relevant for them even if they are not going to be directly involved with the operation's function. This is why the book has very deliberately taken an operations *and process* management perspective. It is vital that everyone understands that, to some extent, they are operations managers because they manage processes. Therefore, everyone has something to learn from operations management. The best way to emphasize this is to use the part of Chapter 1 that illustrates the space occupied by the subject when it was concerned primarily with 'production' management. Then point out the space that the subject occupies when we define it to include any kind of process in any kind of business.

Exercise – It is important to get across the idea that products and services are not always very dissimilar. Indeed, it is sometimes misleading to distinguish between the two. The example of Rolls Royce and other 'manufacturing' companies can be used to make the point that many companies derive the majority of their revenue by providing services. Try giving the class an example of a company that seems to be a manufacturer (e.g. BAE Systems, Caterpillar earth moving equipment, Xerox copiers, etc.) and pose the question, *What services would a company like this need to supply to its customers?* Then direct the discussion to include maintenance, training, consultancy of how best to use the equipment, updating, installation of planning and control systems and other software, providing finance for purchase and so on. A good example is BAE Systems who manufacture aircraft for the military. Rather than purchase the aircraft, many governments are choosing to 'buy capability'. This means contracting for many thousand hours of 'operating capability' per time period. All our Air Force has to do is provide the pilots. BAE Systems does everything else, and probably owns the aircraft also.

Responsible operations

In every chapter, under the heading of 'Responsible operations', there is a summary of how the topic covered in the chapter touches upon one or more important social, ethical and environmental issues. This can be the basis of a useful class exercise or debate.

The motivation for responsible operations is worth exploring as an introduction to the topic. Here is one exercise that can be easily adapted.

Responsible operations exercise

In Chapter 1, the text suggests three reasons why firms want their operations to engage in socially responsible activities.

- Because they are altruistic – simply because it is a good thing to do.
- Because social responsibility and the conventional concerns of operations management coincide.
- Because some activities that address social or environmental challenges also provide other business benefits, such as market development.

Here are some examples of responsible operations activities. To what extent does each fall into one or more of these three categories?

[Chilled dairy products maker] dumps the lids

[Chilled dairy products maker] has announced that from next year it is eliminating the secondary plastic lids on its cream and yogurt pots. This will save over 500 million pieces of plastic a year, most of which are not recycled by consumers. 'It is all part of our ongoing commitment to … . .'.

Unpacking the multi-pack

Dr Ernst Kalsh, CEO of [Superstore] the giant European retailer, said today that it has now eliminated almost all plastic wrapping on its multi-pack items in its stores. 'This is an important move to save on packaging.' He said, 'more than 40% of our customers include at least one multi-pack in their weekly shop. Now the discount will be automatically applied at the checkout'.

Internal announcement

From the start of next month, all staff on Grades C to A will be able to request up to four (4) hours per week to devote their time to pro bono 'Social projects'. Full details of project eligibility and how to apply are available on the HR website.

Yes, we can provide legal advice at very much reduced rates. We have a policy that allows us to support registered charities that sign up to an agreed set of environmental principles. Because you directly advise your clients on recycling issues, you would certainly qualify. (Albertine Kalas, Senior partner at Kalas, Wiggins and Kalas, Law firm)

Teaching Note for End-of-Chapter Case

Kaston-Trenton Service

Case synopsis

Kaston-Trenton Service (KTS) was a UK domestic heating boiler maintenance company, run jointly by Ros, who looked after all marketing, sales and finance, and Mark, who looked after operations and supply issues. The company offered three services – maintenance and repair services to domestic customers, servicing for business customers, and designing and installing HVAC systems for business customers. KTS had a small administrative office that managed accounting, HR, invoicing, contract maintenance and purchasing activities, a workshop shared by the 26 domestic boiler and the 16 business boiler technicians, who are *reasonable about helping each other out*. It is generally easier for the business service technicians to serve domestic customers than vice versa. The installation venture has had *mixed success.* Customers were satisfied, but the extra costs meant that the service was not profitable. In the short to medium term the firm could possibly offer a more 'servitised' offering. In the longer term, there was uncertainty regarding governmental policies towards climate change targets that could profoundly affect the firm.

Using the case

This is an introductory case that can be used to make one or two fundamental points about the role of operations management in general, or if wished, it could be used to introduce several important secondary discussion points that usually arise later in an operations management module.

The case is a 'soft' exercise in that many of the issues are in the form of opinion. It is also quite a complex case in some ways. Its purpose is not to provide students with an opportunity to 'solve a problem'. Rather, it is an introductory case that can be used to open up a number of issues for discussion. Its overall purpose is to introduce students to the richness and complexity of many problems within operations management.

The fundamental points are:

- The needs / expectations of customer groups dictate what operations resources and processes should try to achieve.
- Different product/service offerings often require different types of performance from the operations part of an organisation (simply called 'operations' in future).
- One way of thinking about these differences is by using the '4 Vs' that describe the conditions applying to each product/service offering (volume, variety, variation and visibility).
- Another way is to use the various categories of performance that each customer group requires.

- Even for an operation that is unambiguously a 'service' operation, there is a trend towards a wider concept of 'service' (in this case the idea of 'servitisation').

- When the business environment changes, operations will need to change to accommodate the new circumstances.

Some secondary points are:

- Different types of service can vary in their 'variability' (predictability of the time to do the job) which will have a significant effect of planning work.

- The demand (from customers) for service does not always match the (convenient) availability of an operation's capacity to do the work.

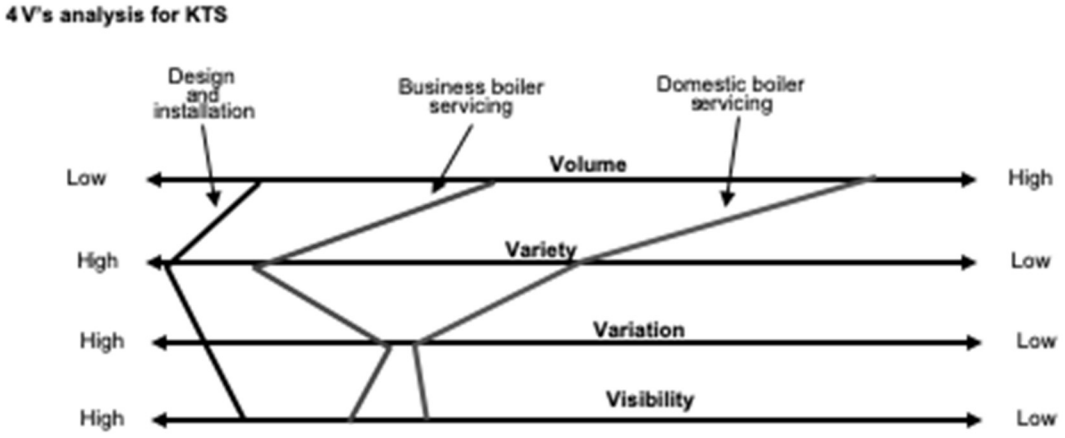
- Customers can vary in their interest in understanding the exact details of the service being offered.

- Forecasting can usually be improved, but the longer ahead a forecast looks, the less reliable it will be.

Questions

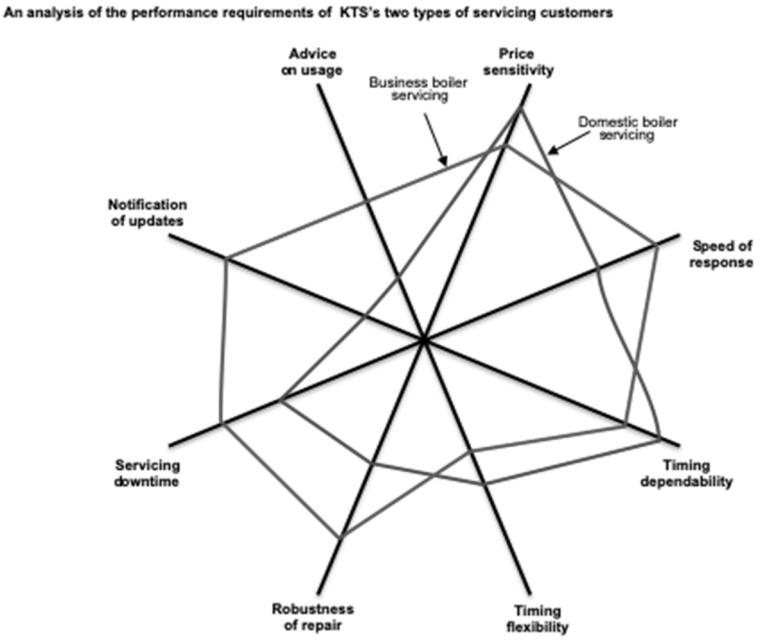
How would you position each of KTS's services on the four 'V' dimensions of volume, variety, variation and visibility?

The point of the 4Vs analysis is not primarily to compare very different offerings but to compare similar, but different things. The three types of offering are shown below. While the design and installation offering is very much at the left side of the spectra (which usually means that creating this type of service has a relatively high cost) the other two services are positioned more to the right (cheaper to produce). However all KTS offerings are relatively high variation (because of the unexpected nature of some servicing) and especially visibility (because of the service has to be performed at the customer's premises).

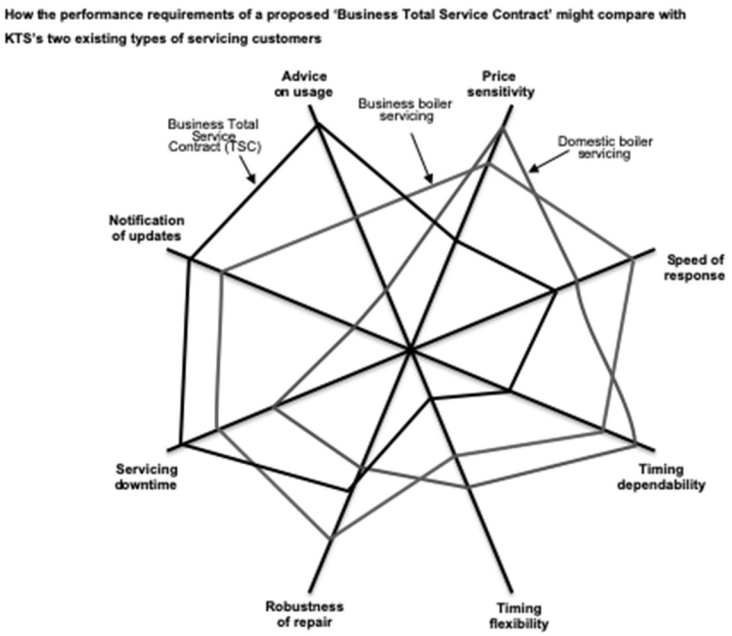


What aspects of performance are important for KTS to win more servicing business?

There are many ways to answer this question. Perhaps most useful is to use a polar diagram similar to the one shown here. The types of performance are obviously chosen to suit the circumstances, but each is mentioned in the case.



How would you evaluate the potential of offering a 'total' service like the KTS customer had been offered?



The total service is clearly a broader service with changes in the balance of risk between the customer and KTS. It demonstrates the concept of 'servitisation' is not something that applies only to physical goods producers. Here is a service provider who is also considering taking over responsibility for a 'total' service in terms of what the service provides. So instead of selling 'the servicing of boilers', KTS would move to selling 'the continuity of heating'.

Some points that could be raised include:

- Servitisation often involves new and ill-understood risks. These include the risks inherent in diverting financial resources away from other activities.

- Servitisation involves significant cultural issues.

- Servitisation can expose costing deficiencies. In particular life cycle costing was seen as a very approximate activity that would have to be improved significantly if servitisation was to avoid unacceptable risks.

- Servitisation redefines risk management. There can be strains regarding the unquantified but probably significant increase in risk in taking over activities previously performed by customers. It may be that at some point the marginal extra risk incurred will outweigh the marginal benefits of increased profit potential.

- Servitisation will impact technology strategy. The value of new but less reliable technologies could decrease when servitisation involves taking on more explicit risk.

- Servitisation poses new opportunities for knowledge transfer mechanisms. Generating knowledge is a key task, especially for frontline staff, yet most companies were dissatisfied with their ability to feed back this knowledge, especially into product design activities.

What should KTS be doing to prepare for possible longer-term changes in their industry?

The nature of the future of both domestic and business heating is likely to be affected by increased measures to limit carbon levels in order to meet the UK's target to reduce emissions (as with most other European countries). What is uncertain is the speed and extent of any legislative changes. This is an 'open' question which is best used to steer students to considering what could be done in advance of any changes.