

# Process Choice, Process Layout and Technology in the Hotel Industry

## Track: Hospitality and Tourism

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This paper considers the issues of process choice, process layout, and process technology in the context of the hotel industry. Despite the importance of these issues, there has been little conceptual discussion and almost no empirical research in the literature. Certain key points emerge from the analysis.

The hotel industry is a complex collection of customer processing, information processing and materials processing operations such that process choice often results in a 'hybrid' of types (job shop, batch production, mass production, mass customisation) within the same operation.

Moreover, due to the specific context of the industry, process layout does not always closely match process type. As a result of this, hotel operations are complex and POM theory is difficult to apply.

## *Introduction*

A hotel is rather like apple pie - it is very familiar, everyone has experienced one and everyone knows which he or she likes best. Hotels are therefore easy to relate to and, as an almost perfect archetype of service operations; they would seem to offer a rich context for the exploration of examples of POM theory. It is perhaps surprising then that hotels are under-represented and sorely misunderstood in the production and operations management literature. Waller (1999) in his book on operations management gives Accor as an example of a service firm and never refers to it again. Out of the 84 firms referred to in this text, one paragraph on Accor is the only reference to a hotel company. There is Heinz, Hershey and Hoover, but no Hilton; McDonalds and McDonnell-Douglas but no Marriott. The same is true of many other POM textbooks. There is no indexed reference to hotels at all in Krajewski and Ritzman (1993), nor Schonberger and Knod (1994). Render and Heizer (1997) have three paragraphs on "how hotel chains select sites" and Slack, Chambers and Johnston (2001) have a one-page case study on Accor's Formule 1 concept.

Perhaps operations management textbooks dedicated to *services* may have more references to this industry? Glynn and Barnes (1995) brought together some of the world's experts on services. Hotels are referred to in little depth only twice. Johnston and Clark (2001) reflect the overall trend and largely ignore hotels except for Holiday Inn. Hope and Muhlemann (1997), based on ideas developed by Lovelock (1983), identify hotel as providing high customisation and low judgement of contact personnel. But a budget hotel clearly has very little customisation, if any and there are circumstances where contact personnel may require a high degree of judgement, such as dealing with customer complaints or emergencies.

Space does not allow for a full review of all seminal journal articles on operations management and the extent to which hotels are used to exemplify principles or concepts. Nonetheless we propose there is a *prima facie* case for suggesting that hotels have some characteristics that make them difficult to analyse. And, in our view, when such analysis is attempted it is not always accurate. Why is this?

## *Understanding Operations*

Our starting point for this exploration of hotels in the context of operations management theory is to ask the question: are all operations the same? If they are then hotels will have policies and procedures similar to all industries in all contexts. It would not be significant that hotels are ignored in the OM literature. But even a cursory consideration of operations theory demonstrates that operations vary quite widely.

One way a discipline copes with diversity is to develop some kind of taxonomy or typology. In the operations management field, Hayes and Wheelwright (1979) (although there are others) proposed a seminal taxonomy. It identifies five operational types: project, job shop, batch process, assembly line, and continuous flow. Most OM academics and practitioners would regard this analysis as a significant contribution to the field of knowledge (Sower et al., 1997). The taxonomy derives mainly from an analysis based on two criteria - product/process mix and process life cycle. In the service literature, a similar taxonomy has been proposed by Schmenner (1986) who identified that services could be categorised according to their degree of labour intensity and level of customisation into four types, which he called service shop, service factory, mass service, and professional service.

These two taxonomies reflect a debate in the OM literature as to the difference between goods and services. In 1978, Sasser, Wyckoff and Olsen published their textbook *The Management of Service Operations* and identified four ways in which services differed, to which a fifth has since been added: intangibility – a service is a deed, performance or effort and as such has no physical dimensions that make it objectively measurable; perishability – services cannot be stored, capacity (such as airline seats, hotel rooms) needs to be filled on each occasion capacity is available; heterogeneity – judgements about service are based on the perception by each individual customer on each individual occasion they purchase the service; simultaneity – service delivery (by the provider) and consumption (by the customer) happen together, both physically and in real time; and ownership – having purchased the service, the customer does not possess any tangible good to show for their expenditure. This debate is of interest since hotels are typically classified as ‘services’ and a hotel stay is often cited as a good example of these five characteristics.

However, even when identifying these differences, Sasser et al (1978) acknowledged that there were very few pure services. Most operations were a bundle of both tangible products and intangible services. The emphasis on hotel operations as being ‘service’ derives from a focus on front-of-house activity and a failure to recognise the importance of back-of-house. Perhaps of more significance is consideration of what flows through the operations process. Morris and Johnston (1987) suggest there are basically three types; materials processing operations (MPO), customer processing operations (CPO) and information processing operations (IPO)

In most cases, any operation is not uniquely a MPO, CPO, or IPO. This is certainly true in hotels. For instance, during the so-called ‘hotel experience’ materials are processed (rooms, food and drink are prepared for consumption), information is processed (orders taken, bills prepared), and customer processing occurs (customers’ requests are responded to, social interaction takes place).

### *Hotel Operations*

Although the difference between processing people and things is often identified in the literature, rarely has it been *systematically* analysed to identify the implications of such differences. Clearly, customers are physiologically capable of action whereas materials are not. Such actions include the ability to move unaided; apply the senses of sight, hearing, touch, taste and smell; and communicate with the environment. As well as this physical interaction, customers also engage psychologically with their environment. This means that each customer’s values and attitudes may be slightly different, they may perceive their experiences differently, and hence they may respond to the service environment heterogeneously.

We therefore propose that operations need to be modelled predominantly as either CPOs or MPOs. If an operation is a hybrid, i.e. it processes customers and materials, then it should be divided into its two constituent parts and each categorised accordingly. This is shown in Table 1.

*See Table 1*

When hotel operations are compared on the basis of volume and variety, consistent with standard OM taxonomical systems, we find that most lie along the diagonal. Schmenner (1986) and Hayes and Wheelwright (1979) argue that it is logical for firms to ‘move towards the diagonal’, i.e. the line that represents a balance between volume and variety. Low variety enables the production of a high volume of standardised output. High volume is necessary as standardised products/services tend to be viewed as commodities that attract relatively low profit margins. However, highly customised products and services can be sold at premium prices, thereby

paying for the relatively inefficient high variety production. Most of the hotel operations we have analysed lie on this diagonal (Jones and Lockwood 1999).

Such comparative analysis of hospitality operations immediately enables us to identify some key aspects of the hotel industry:

1. Hotels are generally more complex than restaurant operations, simply because other than limited service hotels, they provide both lodging and foodservice.
2. Hybrid operations are more complex to manage than non-hybrid operations.
3. Hospitality materials processing operations can be job shops (e.g. à la carte restaurant), batch production (e.g. cook-chill) or mass production (e.g. fast food).
4. Most hospitality customer processing operations are service shops (e.g. table service restaurant) or mass services (e.g. banqueting).
5. There is generally a relationship between volume and variety, i.e. the greater the variety the less volume produced.
6. It follows therefore that hybrid operations that are batch production MPOs are typically associated with service shop CPOs, whilst mass production matches mass service.

### *Process Configuration or Layout*

There are four basic layout types found in manufacturing and service settings (Brown et al 2000). These are:

- **Fixed position** – a single, fixed position at which the product is assembled or service is processed by workers who move to that position for them to carry out their work. This layout is applied to products that are heavy, bulky or fragile such as in shipbuilding, aerospace, or dentistry.
- **Process layout** – machines or activities are grouped together non-sequentially to allow a range of different products to be made. Products move to a particular location for processing according to need. Workers tend to operate within one area, but may be multi-skilled enough to work across areas. This is the typical layout associated with job shop or batch production. It allows for a wide variety of products to be made in relatively small volumes. Breakdown of one machine does not halt production. Examples of sectors that use this approach are jewellery making, hairdressing, and low-volume furniture manufacture.
- **Product layout** – has machinery dedicated to a particular product, usually laid out in a sequence, with distinct stages in manufacture? Workers are usually required to perform relatively simple tasks at one particular stage in the process. Whenever possible such tasks have been automated. This is the layout associated with mass production. It is used in car manufacture, chocolate production and fast food.
- **Combination layout** – this combines elements of the process layout, such as clusters of machines, with product layout, with each cluster being organised sequentially. Hence each cluster or cell can produce in high volumes a variety of outputs based around a single product. This in essence is mass customisation, adopted in high-tech manufacturing operations.

As far as we are aware no one has so far discussed the notion of process configuration as it applies to the hotel industry. It seems to us that two of the four types of layout can be found in

the hotel industry<sup>1</sup>. The provision of accommodation services, i.e. hotel bedrooms, is an example of a **fixed position** layout. Room attendants move from room to room in order to service them. This means that they have to take the technology they need to perform this task with them. The same is true of table-service restaurants. Wait staff go each table to perform their duties and deliver service.

Most traditional food production kitchens have a **process layout**. The kitchen is organised into different sections – larder, sauce, vegetables, pastry, and so on – each of which can produce a wide variety of outputs. The technology in each section is carefully selected to support this activity. For instance a large wooden chopping block in the larder, marble-topped tables in pastry, boiling pans in the veg. section. The same is true when production is scaled up for cook-chill production, albeit that the equipment is considerably larger capacity.

### *Issues in Process Choice and Layout in Hotels*

This analysis of choice and layout identifies some interesting issues with regards the industry. In manufacturing there tends to be quite a close fit between process choice and layout. This derives from the fact that manufacturing is essentially a materials processing operation. Any ‘service’ elements of a product are usually decoupled from the actual manufacture of the product.

However, in hotel operations both manufacture and service happen simultaneously. Hence such operations are both hybrids of process choice and have more than one process layout. This is illustrated in Table 2 which looks at different departments in a hotel from a choice and layout perspective.

See Table 2

Fortunately (it could be argued) many of the processes in the industry are relatively simple and do not require sophisticated technology nor highly skilled labour. Thus the lack of fit between the type of process and the process layout has not become an issue. Housekeeping is a good example. The processes or activities undertaken to clean a guest’s room are basically identical and would normally lend themselves to both production-lining and even automation. If it were physically possible, one could envisage a factory in which rooms moved slowly along a production line and as they did so, a worker (or machine) polished the mirror, another vacuumed the floor, a third dusted the lampshades and so on. Of course, this cannot happen due to the size of the room and its fixed position. Hence tasks which could (should?) be dealt with on a mass production basis are actually managed as a job shop.

The extent to which process choice and layout fit is a major issue because of the implications it has for efficiency. This is further complicated by the parts of the operation used by the customer, i.e. front-of-house. First, the sequence of activity is driven by the random arrival of each customer and second, the precise nature of the process may vary from one customer to another.

### *Future Trends*

One of the lessons that can be learned from this analysis is how change is acting on the industry. Is each of the different types growing at the same rate, or are some types expanding and others declining? Jones (1988) identified three key trends in hospitality operation design: production lining, decoupling, and customer participation.

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<sup>1</sup> Product layout when it was applied to restaurants created fast food. Combined process and product layout is found in flight catering kitchens.

Production-lining refers to the concept of breaking down production activities into simple tasks so that they may be organised on a production-line basis, just as Henry Ford production-lined the motor manufacturing process in the 1920s. It has long been argued (Levitt 1972) that services in general are moving towards more industrialised processes and McDonaldization (Ritzer 1993) may be the result.

Decoupling refers to the idea of separating, both in place and time, back-of-house from front-of-house activity. Often the rationale for doing so is that one or the other (usually back-of-house can be production-lined). For instance, a number of health authorities in the UK have created one large central production kitchen for a number of hospitals and introduced cook-chill, so that the kitchen may produce 5,000 to 6,000 meals for transportation the following day to five or more different hospitals. Hotels can decouple their reservations process from the unit to a central reservations office.

Customer participation is otherwise known as self-service. Many hospitality operations now enable their customers to do things for themselves that were previously done for them. It is possible to check into a hotel by using a swipe card system, select salad items for a self-help salad bar, make your own cup of coffee in your room and check out using the in-room television set.

The introduction of these ideas into the industry has not only led to firms moving *towards* the diagonal, but also *along* it, away from high variety/low volume in the direction of lower variety and higher volumes. For instance, à la carte restaurants and full service hotels have been around since the 1880s, whereas Kemmons Wilson only conceived the mid-service hotel, which he called Holiday Inn, in 1952. Fast food only really began when Ray Kroc took over the McDonalds chain when it had 200 outlets in 1961. Cook-chill and sous-vide are even more recent innovations.

These trends reflect what has happened in many other industries. The final question is the extent to which the hotel industry will follow other industries towards the notion of mass customisation. In this context both high volume and variety are accommodated, using a range of different approaches to achieve this technically difficult task. This remains the biggest challenge for hotel operators. How to provide large numbers of customers with high quality service of their choice, at a low price, and at sufficient speed.

### *Conclusion*

This paper has considered the extent to which the operations management literature has understood and explained hotel operations. It has specifically discussed process choice, process configuration, and process technology. Certain key points have emerged.

In the context of operations management, the hotel industry continues to operate in the craft era with regards most of its processing operations. Some hotel activities, such as central reservations and banquet catering have moved onto the mass production era, and some processes, particularly those related to information processing, have also been automated.

The discussion of process choice has identified that: the hotel industry is a complex collection of customer processing, information processing and materials processing operations; there are three basic process types – job shop, batch production, and mass production – which relate to the volume and variety of output; hotel materials processing adopts all three process types, but customer-processing is largely job shop; and many hotel operations are a hybrid of more than one type.

The discussion of process configuration demonstrated that: some operations in the industry have a close match between process type and process layout; but other operations have an inappropriate layout for their type of process; while other operations include a variety of process layouts. This leads to a clear problem in the effective management of hotel operations and a complementary problem in using the complexity of hotels to explain some POM concepts and theories. Like apple pie, doing it right turns out to be not that simple after all.

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*Table 1*  
*CPOs, MPOs and hybrids in hospitality*

<b>Predominantly CPOs</b>	<b>Predominantly MPOs</b>
Full service accommodation	Cook chill
Mid service accommodation	Tray serve
Limited service accommodation	Home delivery
Hostel accommodation	
Long term residential accommodation	
<b>Hybrid operations</b>	
	{ A la carte kitchen
Table service restaurant	{ Table d'hôte kitchen
	{ Call/short order kitchen
Buffet/sandwich bar	Buffet/sandwich bar
Fast food restaurant	Fast food kitchen
Hibachi style restaurant	Hibachi style restaurant
Counter/cafeteria style	Assembly serve

Jones and Lockwood (1999)

*Table 2*  
*Process choice and process layout in a hotel*

<b>Hotel Department</b>	<b>Type of Process</b>	<b>Process Layout</b>
Front office	Job shop	Process layout
Housekeeping	Mass production?	Fixed position
Bars	Job shop	Process layout
Kitchen	Job shop	Process layout
Restaurant	Job shop	Fixed position
Banqueting service	Batch production	Fixed position
Leisure facilities	Job shop	Process layout
Room service	Job shop	Fixed position

Jones (2000)