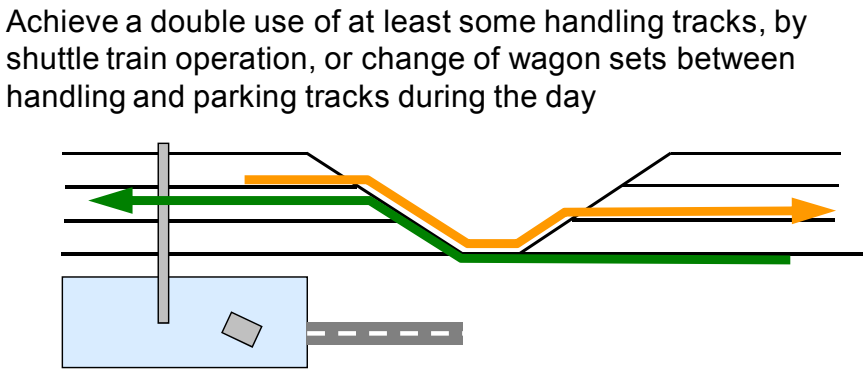
2.1 Increase of flow factor

Description

If the track capacity of a given terminal infrastructure, on a daily average, is employed by only one intermodal train including the inbound and outbound services the terminal applies a static operational concept. In this respect, the so-called “flow factor” which is the mean frequency the total length of the handling tracks are employed, is 1.0. Each track is only used once a day for an incoming and outgoing train. In contrast to that, a flow factor of 2.0 means that every meter of handling track on average has been used by two different trains or services for inbound and outbound shipments.

It is obvious that the implementation of such a dynamic operational concept is one of the most effective measures to enhance the capacity of a given terminal infrastructure. Raising the flow factor from 1.0 to 2.0 implies a – theoretic – doubling of the transshipment capacity. Since the capacity impact is so tremendous this “soft” operational measure is recommended to be enforced in as many terminals as possible (cf. Figure 2).

Figure 2: Increase of flow factor



Source: KombiConsult analysis

Prerequisites and implementation

Not every terminal operator, however, is in a position to increase the flow factor of its facility. For this purpose, following prerequisites must be fulfilled:

- In the first place, it requires sufficient demand of intermodal services.
- If the terminal is served by multi-frequency shuttle trains, which require fast turnaround times of about three to six hours, handling tracks could be em-

ployed a couple of times per day.

- If those efficient shuttle services do not call at the terminal the wagon sets need to be shunted between the handling and parking tracks to allow for the exchange of trains. This requires either for an appropriate number and length of parking tracks at the transshipment facility or close to the site to avoid uneconomic shunting operations.
- Since it is most unlikely that, both in export and import, all intermodal loading units could directly be transshipped between trucks and wagons (live-lift operation) a well-dimensioned intermediate storage space is absolutely required.
- Also, the capacity of the handling equipment (cranes, reach stackers, and terminal trucks) must be sufficient to cope with an increased amount of units

If the prerequisites were met, an overworked terminal operational concept could be generated for the implementation of this measure. This contains:

- A new set-up of time windows or slots for using the terminal by additional intermodal services.
- New track occupation diagram and
- A shunting concept.

In coordination with the existing time windows and in consultation with relevant parties new time slots for loading and unloading of the additional intermodal services needs to be created. The result is a new track occupancy diagram.

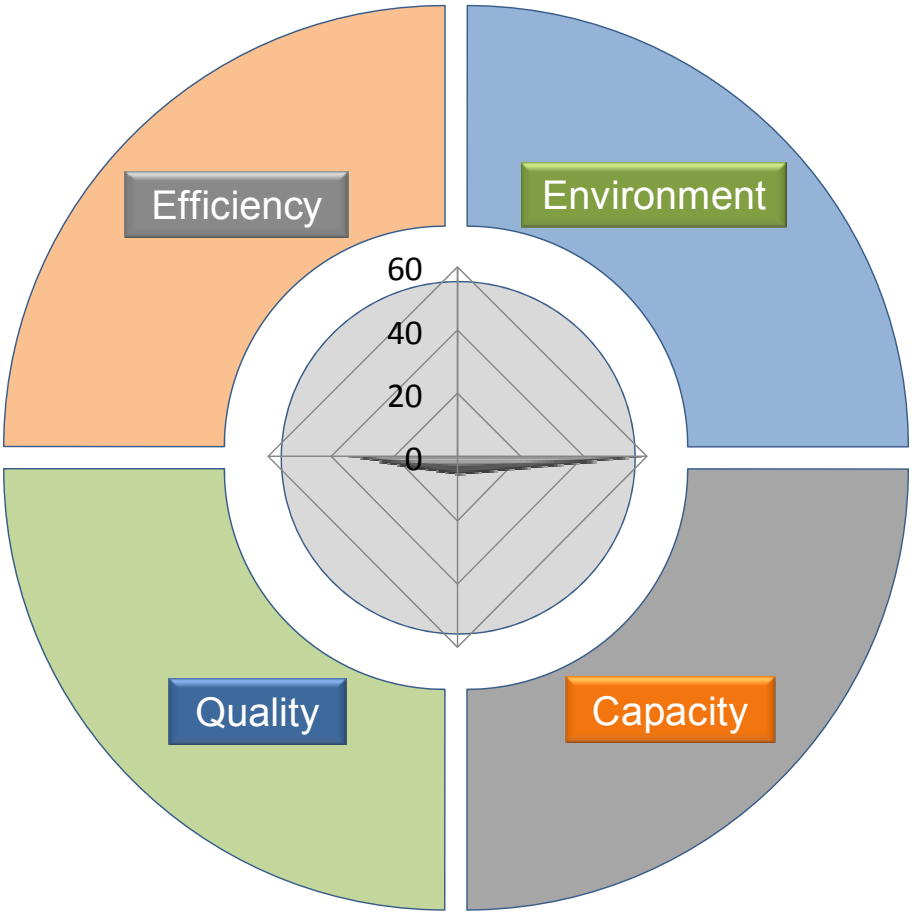
Not only when applying the “flow factor” but also in usual operation the wagon sets entering and leaving the terminal requires a shunting operation. Shunting is also needed to replace damaged wagons or include additional ones. The shunting operation can be organized in different ways. The most common practice is that the lead railway undertaking or local railway undertaking manages and physically performs the shunting operation. Anyway, it needs to be taken into account that the increasing shunting interactions will probably cause higher coordination and communication needs at the interface between shunting and terminal operations.

Impacts and benefits

An increase of flow factor has a positive impact on terminal capacity and efficiency (cf. Figure 3). Depending on the selected (new) flow factor, terminal capacity can be increased from 50% and up to 100%. At the same time, the terminal handling efficiency is going to be improved, since the doubling of the capacity can be achieved without any extension of terminal infrastructure.

Besides this, the increase of shunting gives rise to higher energy consumption and in consequence to a negative environmental impact (pollutant emission, noise pollution).

Figure 3: Impact of the measure "increase of flow factor" on the four main goals



Source: KombiConsult analysis

Costs

Except the additional personnel cost for developing the new track occupation diagram and increased coordination between the involved parties (see below) this action may cause investments in sufficient quantity of parking tracks. But more often than not, terminals have got enough parking tracks available. Anyway, the shunting operations will increase significantly and at the same time the operational costs for shunting

Involved Parties

- Railway undertaking (Shunting Service)
- Terminal operators
- Intermodal operators

Conflicts of goals

According to the experience certain trade-offs increase with growing flow factor:

- more shunting is necessary
- growing complexity of the terminal operation
- potentially longer waiting time and of a higher probability of delays
- increasing of coordination expenses

Positive experiences with flow factors exist up to a magnitude of 2 to 2.5 without leading to significant inefficiencies. In this context, it should be noted that a higher flow factor and the handling of additional transshipment volume go hand in hand with an increasing of shunting operations and a higher level of coordination between the involved parties. Finally, the further raise of the flow factor would increase the shunting operations so far that the benefits of multiple use of the track can be reversed.

In the event, that the time slots cannot be met for operational reasons (time delays), information and coordination needs between the involved parties are getting higher. In addition, risk of delays is increased. The track utilization is higher and the terminal slots may be used alternatively in case of delays, so that may arise for the delayed train additional waiting times.

References

- KTL Ludwigshafen

- RSC Rotterdam and Wels