

T&E Decision Tree

Understanding corporate spending patterns

A strategic approach to travel and expense analysis





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1. Executive summary

In many companies Travel and Expense (T&E) spending represents a significant expense: controlling it is crucial to business operations and success.

Understanding T&E spending can be reduced to understanding three fundamentals about each expense item:

- The type of service or product bought
- The spending behavior of the employee
- The business driver (context) of the expense

To put it simply, one needs to look at the what, the how and the why behind each expense line. Today, basic T&E analyses present a cost breakdown by the type of service bought, while more advanced studies focus on employees' compliance with the corporate spending policy.

In this publication we propose a new approach to analyzing T&E costs. Besides taking into account the type of service or product purchased, this approach naturally weaves in business drivers and employee behavior from the very start of the analysis. Our method involves two steps:

- Expenses are sorted into five categories using a decision tree framework. Specifically, our T&E Decision Tree consists of a series of four algorithms which establish whether the expense:
 - o (1) occurred while traveling
 - o (2) was associated with a regular travel supplier (air, hotel, car)
 - o (3) was made through the Travel Management Company (TMC)
 - o (4) was different from the TMC amount recorded at booking time
- Each category is then broken down into subcategories, with the emerging spending pattern investigated to identify specific areas for optimization.

The first step allows an immediate high-level view on where T&E money is spent, while the second step takes us closer to the actions needed to improve spending. These actions include adjusting the business drivers (modifying the amount of travel or expenses), improving employee purchasing behavior and policy compliance, as well as negotiating new partnerships with certain suppliers.

To illustrate how the T&E Decision Tree approach works in practice we will use two applications: one related to the total cost of a trip and the other focusing on the costs of ancillary services.

We believe this method will guide finance, procurement and travel management professionals to an improved understanding and optimization of T&E costs.

“ The complexity and sheer volume of T&E information make it challenging to process, manage and interpret...

”



2. Introduction

Travel, procurement and finance professionals are looking to get more value out of T&E data [Ref. 1].

However, the complexity and sheer volume of T&E information make it challenging to process, manage and interpret. To deal with this complexity, Carlson Wagonlit Travel (CWT) has developed a T&E Decision Tree that compiles T&E information into a dynamic framework. The algorithms in the framework go beyond the traditional cost analysis by combining massive amounts of data into a handful of spending patterns, helping to understand why and how money is being spent, thereby bringing traveler behavior into the equation.

The T&E Decision Tree produces intuitive results that can pinpoint those areas of T&E requiring specific focus and action. We believe this approach will help decision-makers make the most of their spending while contributing to enhanced safety and security, higher policy compliance and a better traveler experience.

NOTICE

Please note that while the figures and results contained in this report are based on a real sample of corporate data, they are meant to be illustrative. They help simulate how the T&E Decision Tree works and what output it produces.

Every client spending profile naturally yields different results and thus different actions required for T&E optimization.



The T&E Decision Tree

As illustrated in Figure 1, the T&E Decision Tree uses a series of four algorithms to break down T&E spending into five main categories, reflecting the demand for travel and traveler behavior. Starting from the base of the tree, these are:

- **Travel management company (TMC) booked services:** typically air, hotel or car reservations¹.
- **Extra expenses:** subsequently added by the traveler to the TMC-booked services. These include for example air ancillary fees or GPS navigation charges.
- **Off-channel purchases:** air, hotel or car reservations not made through the TMC.
- **Auxiliary spending:** incurred during a trip but not booked through an airline, hotel or car rental company. Some examples are meals, printing costs, parking or taxi fare.
- **Non-trip spending:** office supplies, short commutes or travel using personal car.

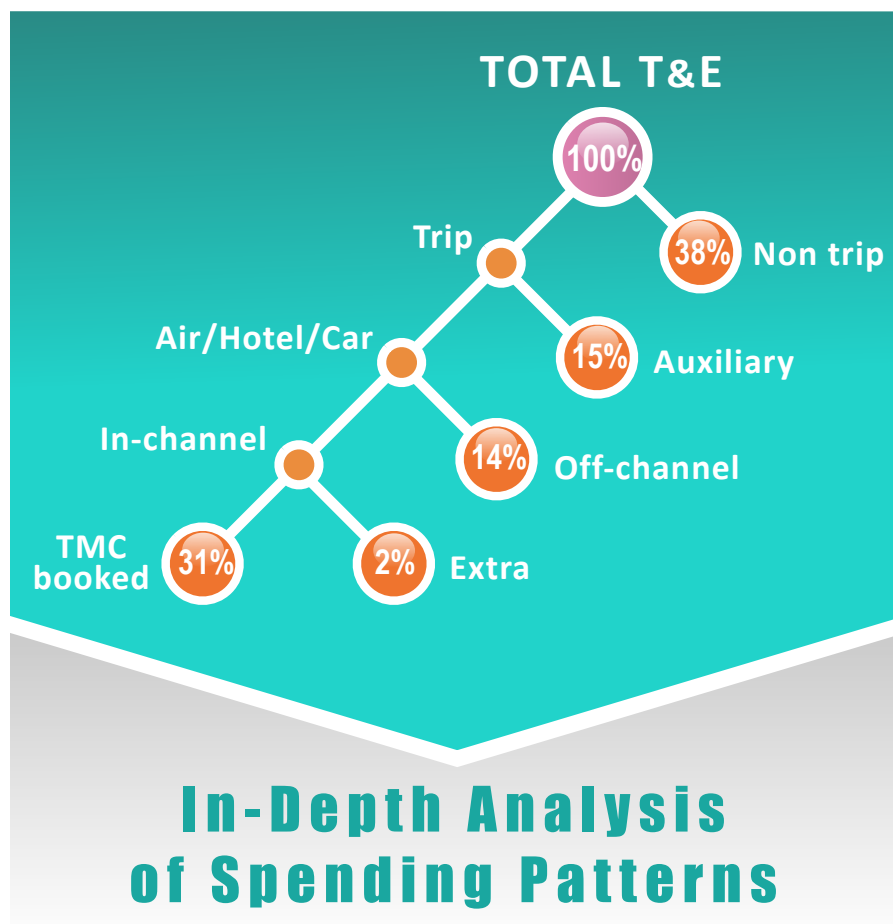


Fig. 1. The T&E Decision Tree.
The percentages in the orange circles add up the total T&E, or 100%.
Please note the data shown here is illustrative only.

In a nutshell, the T&E Decision Tree sorts transactions into five main categories. Once categorized, spending is further broken down into subcategories to single out specific areas of optimization; this will be explained in the next section.

¹For the current study we omitted the rail component as travel was performed mainly in North America. For European companies however, rail bookings are expected to account for a significant portion of T&E spending.



3. T&E Decision Tree analysis

The starting point for the analysis is the T&E expense dataset typically obtained by aggregating data from the expense reporting system, credit card, lodge card, or financial accounting system.

For this study, we have used a sample of 300,000 transactions from various CWT clients. To each transaction we successively applied the four-level classification algorithms shown schematically in Fig. 1 (starting from the top) as described below.

Level 1: Trip and Non-trip Spending

Determining the portion of spending associated with actual traveling is the first step towards understanding T&E. In certain companies the client base may be mostly local (especially in large cities) while for other companies employees will travel longer distances to sustain strong client relationships.

Splitting the total T&E into travel and non-travel parts follows the CWT Trip Reconstruction principles [Ref. 2] and uses the following method:

- Transaction blocks are formed from expenses that have the same trip identifier, where applicable, or have similar date ranges.
- Blocks that contain at least one air travel, lodging or car rental transaction are tagged as **Trip** blocks. All other expense items are labeled **Non-trip**.

Figure 2 shows the split between Trip and Non-trip expenses. Figure 3 shows the different Non-trip subcategories, with business meals topping the list.

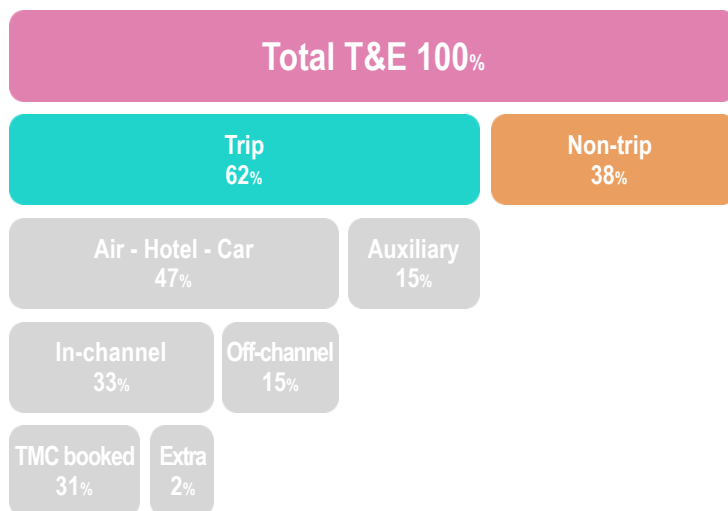


Fig. 2. Total T&E breakdown between Trip and Non-trip categories.

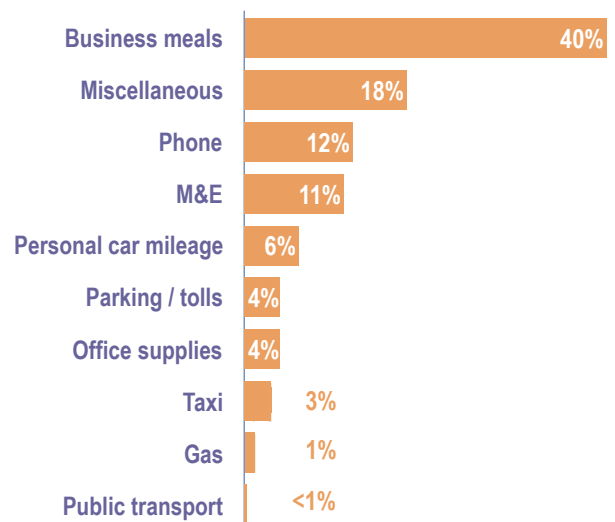


Fig. 3. Non-trip spending subcategories.



Level 2: Auxiliary Spending

Besides air travel, accommodation and car rental, trips involve other elements such as meals, taxi, parking, etc. which we will refer to as **Auxiliary spending**. Depending on the company, length of stay or traveler behavior, Auxiliary spending can be significant; for the dataset we have used, it amounts to 15% of the total T&E.

We can further investigate the Auxiliary category by breaking it into subcategories (see Figures 4 and 5) with meetings and events (M&E) and business meals coming top of the list. The M&E subcategory includes team meetings, training programs, conferences etc. Scrutinizing these patterns in detail is the first step toward optimizing Auxiliary spending.

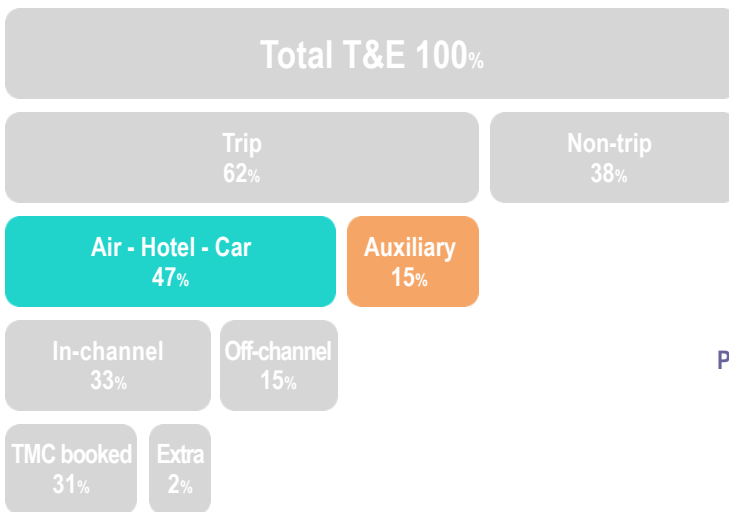


Fig. 4. Auxiliary spending as a percentage of total T&E.

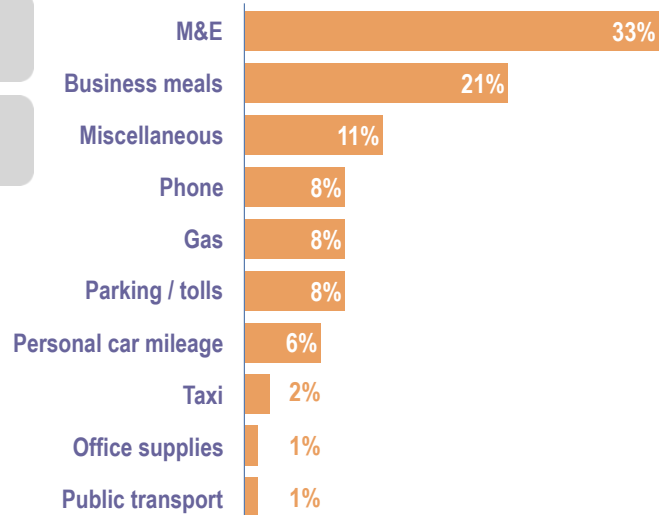


Fig. 5. Auxiliary spending subcategories.



Level 3: In-channel and Off-channel Spending

Air travel, accommodation and car rental costs make up around half of the total T&E spending (Figure 4). Booking these services typically involves a TMC, which helps enhance travelers' safety and security. Booking **In-channel** (i.e. through the TMC) also helps travel managers track and lower expenses with main travel suppliers, which include airlines, hotel chains and car rental companies.

By contrast, direct bookings by the traveler (without going through a TMC) are referred to as **Off-channel** or "leakage", and their contribution can be measured by bringing together the expense and TMC datasets.

The process of finding the same air, hotel, or car transaction in both datasets is called "transaction matching". Often, the absence of a unique transaction code across the two datasets makes it necessary to simultaneously match multiple transaction elements such as dates, location or supplier names etc. To allow for occasional differences (spelling, typos, formatting) between the TMC and expense records we employ a fuzzy matching technique [Ref. 3]. Namely, we form all possible TMC-expense pair combinations and for each pair we compute a similarity score; the larger the score, the more closely the transaction elements match between the two datasets.

15% of total T&E corresponds to Off-channel bookings, and almost three quarters of the Off-channel spending comes from direct hotel bookings (see Figures 6 and 7). For the dataset we have used here, about half of all hotel bookings were not made through the TMC (Figure 8).

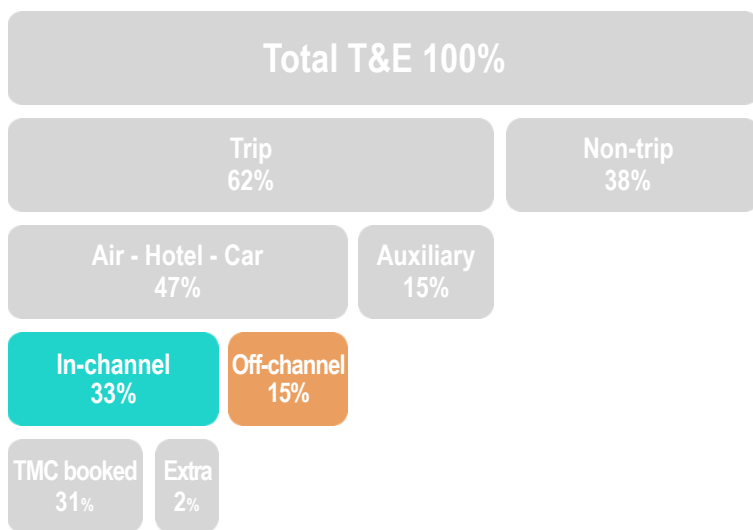


Fig. 6. In-channel and Off-channel spending as a percentage of total T&E.

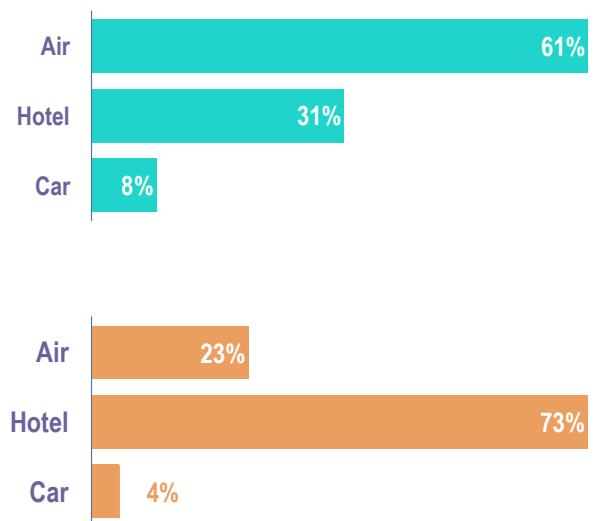


Fig. 7. In-channel (top) and Off-channel (bottom) spending breakdown into air, hotel and car subcategories.

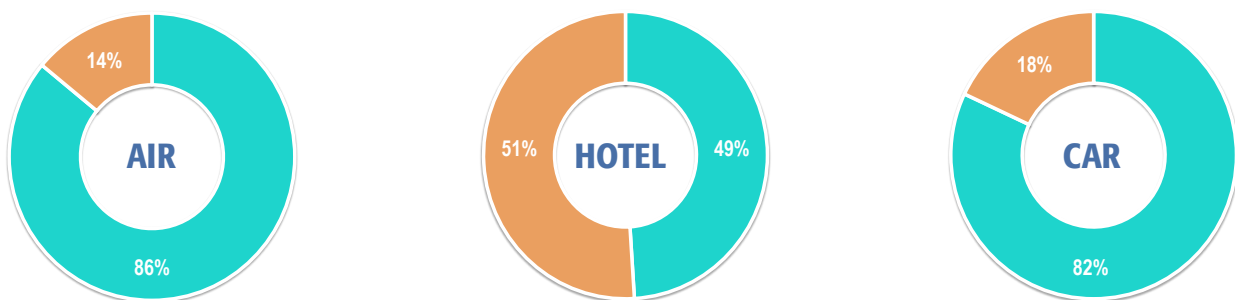


Fig.8. In-channel vs Off-channel split for the air, hotel and car subcategories.





Level 4: TMC booked and Extra Spending

In-channel spending can be further divided into **TMC-booked** and **Extra** components. The TMC-booked category is made up of all In-channel bookings recorded by the TMC. Extra spending contains two main elements:

1. **Ancillary** expenses incurred in association with TMC-booked transactions but not purchased through the TMC. Examples include baggage fees or extra legroom for air travel; room upgrade or pay-per-view for lodging; and insurance, GPS navigation for rental cars.
2. **Non-itemized Auxiliary** expenses, arising whenever travelers are issued a single receipt for a combination of services. For example, a traveler may receive a single bill, non-itemized, for a hotel stay, laundry service and in-room dining. These Auxiliary services (laundry and dining) will generate a difference between the TMC-booked room rate and the final expensed amount.

Figure 9 shows that Extra spending accounts for 2% of total T&E or about 6% of TMC-booked services. Figure 10 shows how TMC-booked and Extra spending breaks down across air, hotel and car subcategories. For each of these subcategories, Figure 11 presents the split between TMC-booked and Extra contributions.

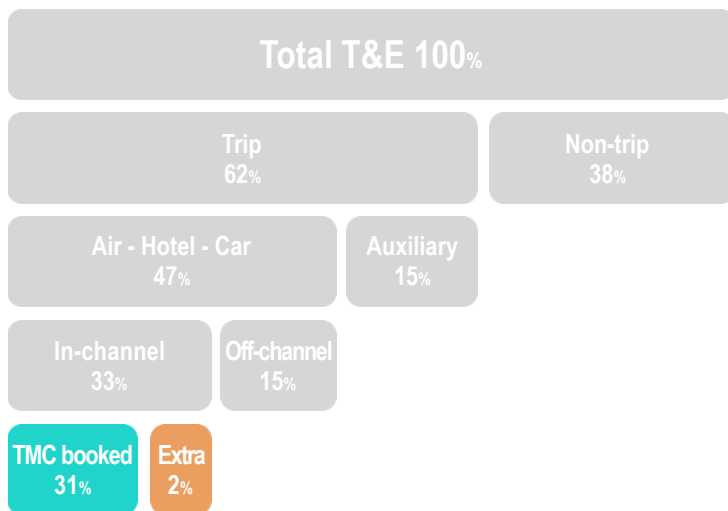


Fig. 9. TMC-booked and Extra spending as a percentage of total T&E.

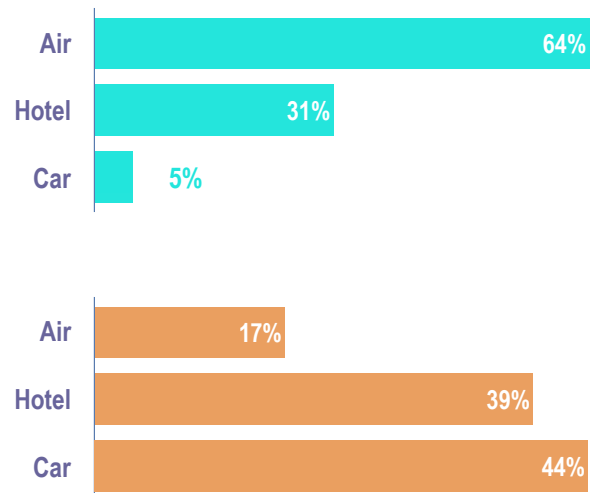


Fig. 10. TMC-booked (top) and Extra (bottom) breakdown into air, hotel and car subcategories.

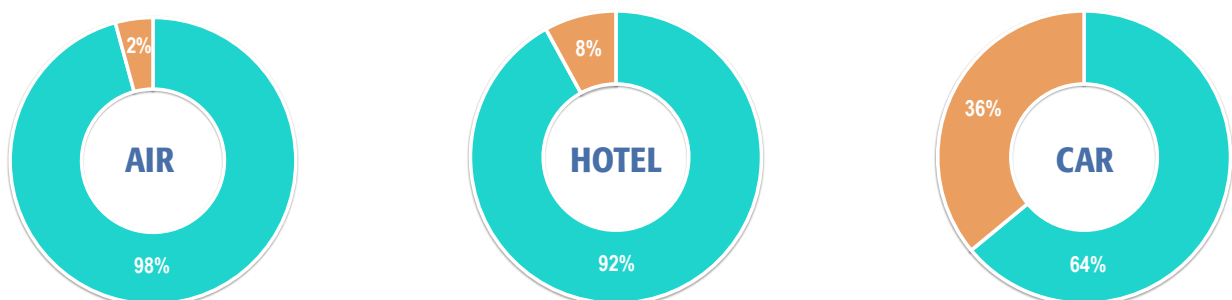


Fig.11. TMC-booked vs Extra split for the air, hotel and car subcategories.





4. T&E Decision Tree framework applications

The T&E Decision Tree analysis system helps travel optimization in a number of ways. For example, compliance can be increased by investigating Off-channel expenses to understand when and why travelers are opting to book directly with air or hotel suppliers rather than through the TMC [Ref. 4]. Other analyses may study the emergence of peer-to-peer accommodation or ride-sharing services in business travel [Ref. 5].

In this section we focus on two applications, one related to the total cost of the trip and the other related to Extra spending.

Total Cost of Mobility

Employee mobility, be it on short distances or longer trips, requires a number of services besides the core transportation segments. Non-trip spending patterns determine the cost of urban mobility. Similarly, Auxiliary spending can have a significant impact on the trip cost.

Using the first level of the T&E Decision Tree, we estimate the average cost of a trip to be \$975 across all trips in our data set. As shown in Figure 12, Auxiliary spending makes up close to a quarter of the total cost of the trip.



Fig. 12. Average total cost of trip estimated at \$975. Auxiliary spending represents 23% of total cost of trip.

The average cost of the trip can be calculated for different types of trips and used for benchmarking purposes. Travelers and travel approvers can use these benchmarks in deciding whether to take the trip or approve the trip request, respectively.

As an illustration, consider a Chicago-New York return flight priced \$400. If we knew that on this route the airfare is expected to account for 40% of the total cost of the trip, then the traveler (or approver) should make their decision based on a total cost of \$1000.



Extra Spending in the Air, Hotel, and Car Subcategories

For air travel, most ancillary services are purchased at booking time yielding no discrepancy between booking and final expensed amounts. However, exceptions do occur and overall, air ancillary fees purchased outside the TMC amount to 2% of the total air spending.

To understand which ancillary services are bought by travelers, one can use publicly available mapping tables based on a combination of airline identifier and transaction amount. Alternately, text analytics can be used to automatically read and interpret the comments entered by travelers when filing their expense reports. By applying this method to our subset of ancillary data containing traveler comments (40% of all air ancillary records), we found that 90% of ancillary spending was on baggage fees, 4% on flight modifications, 4% on preferred seating and about 1% on on-board internet access.

Similarly, hotel Extras account for 4% of the total hotel spending. The situation is very different for car rental bookings as described below.

Extra Spending in Car Rental

As shown in Figure 13, car rental Extras can add up to a significant amount of the total car spending, with a third of all rentals exceeding the TMC-booked amount by \$50 or more. Our analysis shows that, on average, travelers expense a car rental cost which is \$48 higher than the initial booking amount, a 67% increase over the initial cost. Most of this is attributed to taxes and fees which can be particularly high at airport rental locations; the rest is taken up by insurance, navigation, car upgrade etc.

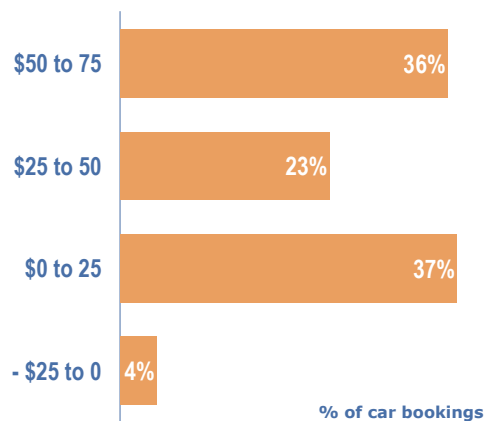


Fig. 13. Difference between expensed and booked amounts for car rental transactions.



Additional Applications of the T&E Decision Tree Analysis

Besides the actions previously discussed, we can envision several complementary applications of the T&E Decision Tree analysis.

Align T&E with business objectives. The T&E split between trip-related and non-trip-related spending should reflect corporate priorities. Global business expansion is typically accompanied by a higher proportion of trip-related spending. Conversely, a travel “freeze” should result in a higher non-trip related spending.

Reduce Non-trip spending. Non-trip costs can be scrutinized by breaking them down into subcategories and analyzing their relative contributions. For instance, if business meal spending is sizable, then supplier agreements with local restaurants or catering service providers are the answer. This is just one example: other options will become apparent by examining each subcategory and isolating those expenses which are significantly higher than average. Recurring high-spend behavior can also be flagged and discussed with the employees concerned.

Reduce Auxiliary spending. One can gain deeper insights into the total cost of the trip by knowing the relative importance of the different subcategories of Auxiliary spending. As with the Non-trip category, actions to lower these costs include negotiating supplier partnerships and modifying traveler behavior when outliers and recurring high-spend patterns are identified.

Improve traveler compliance. Off-channel spending can be split into air, hotel and car subcategories and further analyzed to understand which suppliers tend to get the highest share of Off-channel bookings (e.g. low cost carriers, sharing economy providers etc). Actions to improve compliance include negotiating new supplier partnerships and correcting recurring Off-channel booking behavior, for both travelers and travel approvers.

Reduce Extra spending. Possible actions to lower Extra costs include negotiating deals for popular ancillary services such as GPS navigation, or using supplier data to understand if employees are paying for services which have already been included in the negotiated rate, such as insurance fees.

“ We take standard expense monitoring one step further by advocating the study of all five categories simultaneously, rather than in isolation, at the very start of T&E data analysis... ”



5. Conclusions

We have introduced a simple and insightful methodology to analyze T&E spending. The T&E Decision Tree approach opens new windows into understanding why and how money is being spent by employees, which in turn helps identify the areas of spending where action is most needed in order to mitigate costs and improve employees' compliance and travel experience.

The benefits of the T&E Decision Tree approach are three-fold:

1. **Strategic perspective:** it provides a single view over five important categories of T&E spending. These categories are defined to reflect and incorporate the demand for travel as well as traveler behavior.
2. **Simplicity:** it produces a numerical and visual output which is easy to understand and interpret.
3. **Flexibility:** it can be further expanded to integrate new subcategories and algorithms if needed to understand other aspects of T&E spending. For example, new subcategories can be defined by the booking channel used (online versus agent-booked) or the form of payment used by the employee (corporate card or other).

The basic ideas behind this framework are not new: for example, many companies are routinely analyzing one or two categories such as Off-channel bookings or Extra spend in order to increase compliance. However, we take this one step further by advocating the study of all five categories simultaneously, rather than in isolation, at the very start of T&E data analysis. This allows companies to pinpoint and prioritize the main strategic areas for optimization.

This is a new, structured approach for analyzing T&E spending. It will help corporate travel and purchasing decision-makers improve spending control and enhance safety and security, policy compliance and the traveler experience.



6. References

- [1] CWT, Travel Management Priorities for 2015, www.cwt-tmp-2015.com (2015)
- [2] CWT Solutions Group, CWT Trip Reconstruction (2013)
- [3] We employ a standard fuzzy matching technique as described in the following website and references therein:
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- [4] CWT Travel Management Institute, "Where now for managed travel?" (2014)
- [5] CWT Travel Management Institute, "Faster, smarter, better?" (2015)

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