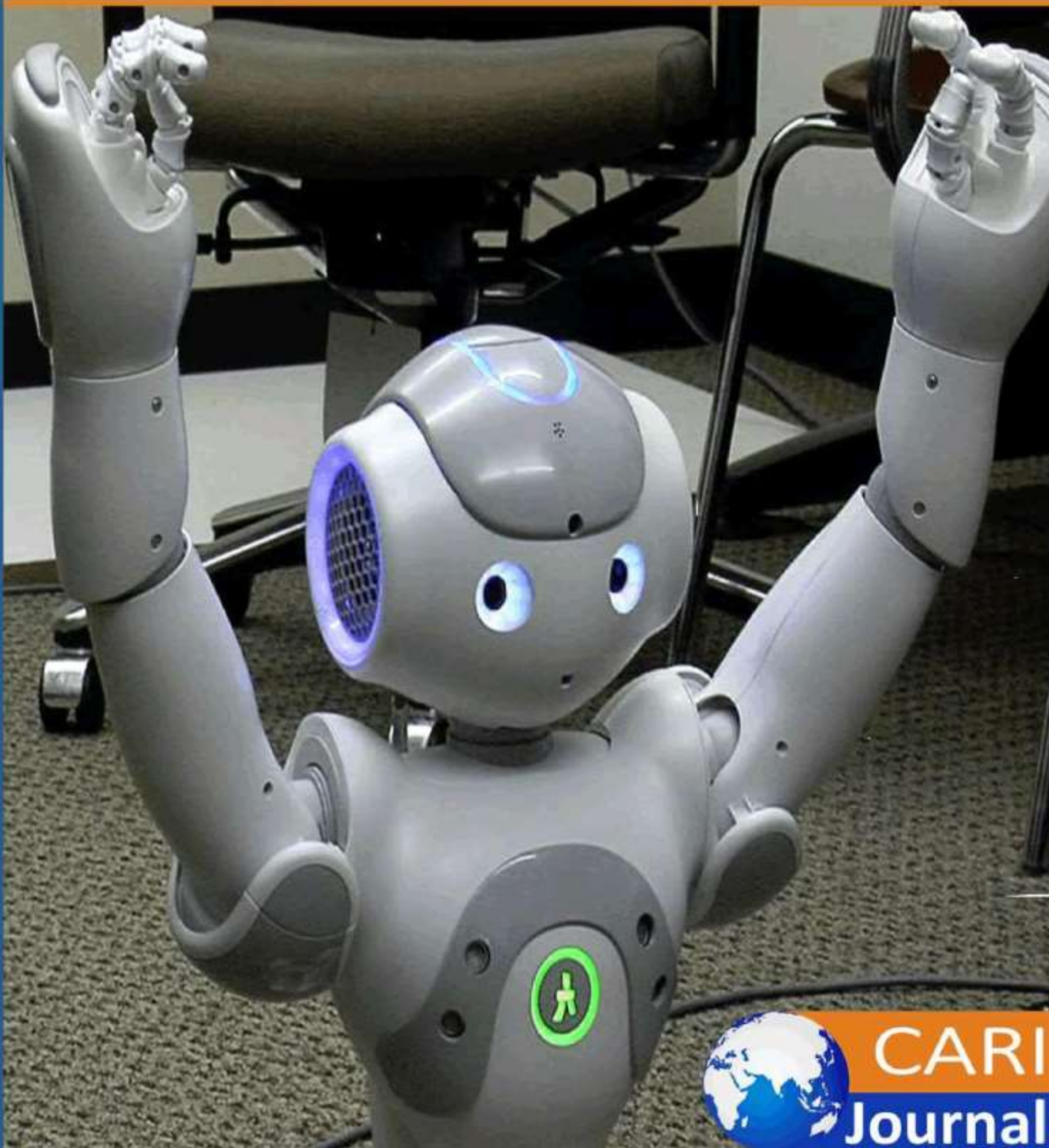


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(IJCE) Forwarding Order Management in Logistics Service Providers: The
Forwarding Order as the Profit-Bearing Object in Enterprise
Transportation Management



Forwarding Order Management in Logistics Service Providers: The Forwarding Order as the Profit-Bearing Object in Enterprise Transportation Management



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Abstract

Purpose: This paper examines forwarding order management in SAP Transportation Management (SAP TM) as configured for logistics service providers and tests one organizing idea: the forwarding order is the profit-bearing object of the business, meaning the document on which sell-side revenue and buy-side cost can be read together.

Methodology: The study is a descriptive, design-level analysis supported by one documented deployment. It analyzed the forwarding order in SAP TM using the vendor's application documentation, a reference text on the system, and the configuration and project records of the deployment. A feature was included if it changes what the provider charges, what the provider is charged, or when either figure becomes known. The deployment is a single case at the North America operations of a large global transportation company. Its data are two counts: new settlement disputes per week and the size of the dispute backlog. The study has no survey, sample, or human subjects.

Findings: Three results emerged. First, three design elements carry margin directly: the item hierarchy, which sets chargeable weight on both sides; the stage model, which fixes when cost is recognized; and the cost pull, which sets the boundary between customer revenue and provider cost. Second, buy-side cost reaches the forwarding order by distribution from execution documents, so margin per order is a staged estimate. It is final only after carrier charges are settled, and its quality depends on charge accuracy. Third, in the deployment studied, correcting charge calculation at its source cut new settlement disputes by about nine percent per week and reduced the backlog from about 4,000 cases to under 400. The case measured disputes, not margin, so the link to margin is inferred.

Unique Contribution to Theory, Practice, and Policy: For theory, the paper links the transaction-level costing literature to the design of a transportation management system and sets out a staged view of margin per order. For practice, it offers guidance: capture the order accurately, keep both financial sides on it, configure the cost-revenue boundary deliberately, and guard the charge accuracy on which every margin figure depends. For policy, it points to the finance rules that should accompany that design: a defined margin, an owner for the cost-pull configuration, and reconciliation of estimated margin to final margin.

Keywords: *Buy-side and sell-side settlement, Forwarding order, Forwarding settlement document, Item hierarchy, Logistics service provider, Provider margin*

1. Introduction

A manufacturer that ships its own goods thinks about transportation as a cost to be minimized [2], [4]. A logistics service provider thinks about it as a product to be sold, and that difference changes everything about how the work is organized. A provider buys transportation from carriers and sells it to customers, and its entire business lives in the gap between the two prices. Managing that gap, order by order, is what forwarding order management is for.

At the center of that management is the forwarding order. It is tempting to see it as just another transportation document, a cousin of the freight order used on the shipper side, but it plays a different role. A freight order records an instruction to move goods. A forwarding order records a commercial transaction: a promise made to a customer at an agreed price, which the provider will fulfill by buying movement from one or more carriers at a cost it hopes is lower. That makes the order not only an operational record but a financial one, and its two faces, what was sold and what it will cost to deliver, are the two sides of the provider margin.

This paper uses a few terms with care. A *logistics service provider* (LSP) is a firm that sells transportation and related services and does not necessarily own the vehicles that perform them. A *forwarder* is an LSP in its role of arranging movement across carriers and modes. The literature often says *third-party logistics* (3PL), which usually implies a broader contract service that includes warehousing [9], [15]. This paper says LSP throughout and uses 3PL only when citing work that does.

The forwarding order and the freight order are both documents in SAP Transportation Management (SAP TM), the system examined here, so the difference lies in role and data, not in technology. The forwarding order records what the customer bought. It is tied to a sales organization and a forwarding agreement, and it is settled to the customer through a forwarding settlement document. The freight order records what the provider instructs a carrier or its own resource to do. It is tied to a purchasing organization and a freight agreement, and it is settled through freight settlement. One order faces the customer. The other faces the carrier.

The paper treats the forwarding order as the *profit-bearing object* of the provider. By this we mean the document on which the revenue and the cost of one transaction can be read together. This is an analytic lens and a claim about system design. It is not an accounting claim. Revenue recognition and the ledger stay in the ERP system.

Existing research leaves a gap here. Work on third-party logistics concentrates on outsourcing decisions, user views, relationships, and performance [1], [8], [9], [15], [16]. Costing research shows that averages hide differences in what transactions earn, and it offers activity-based and time-driven methods to expose them [3], [7], [12]. In the sources we reviewed, neither stream examines how an operational transportation system attaches the sell side and the buy side of a transaction to one record. Practitioner texts describe the system's functions [10] but do not test what those functions do to margin. Section 2 develops this gap and states three research questions.

The claim is limited on purpose. This paper does not argue that every feature of the forwarding order exists for margin. Some exist for execution. It asks, feature by feature, whether the feature changes what the provider can charge, what the provider will be charged, or when either figure is known, and it reports where the answer is no.

The paper is organized as follows. Section 2 reviews the literature and sets out the framework. Section 3 describes the method. Sections 4 to 6 describe the forwarding order document, the item hierarchy, and the stages, and each ends by tracing its link to margin. Section 7 separates the sell side from the buy side and explains how cost reaches the order. Section 8 reports the findings. Section 9 discusses them, including their limits. Section 10 concludes with recommendations.

2. Literature Review and Conceptual Framework

2.1 Logistics Service Providers and Their Margin

Research on third-party logistics grew with outsourcing in the 1990s. Early work asked whether the model had a future [1]. Later reviews organize the field mostly around the outsourcing decision, the choice of provider, the customer-provider relationship, and performance [9], [15]. Survey work has asked users, such as large manufacturers, what they buy and why [8]. Work on the provider side describes the provider's role in collaboration and coordination [16]. Textbooks describe transportation as a service bought from carriers and sold on [2], [4]. Across these sources, the provider's own margin is assumed more often than it is examined.

2.2 Transaction-Level Profitability

Cost accounting supplies the tools to ask where margin is made. Activity-based costing showed that averages hide large differences in what products and customers earn [3]. It was applied to logistics in the 1990s [12]. Time-driven costing later simplified the method by estimating the time each activity takes [7]. These approaches treat the cost assignment rule as the object of design: which charges attach to which transaction, and when, decides the profit the transaction appears to earn. They say less about the operational system that holds the transaction record.

2.3 Charge Accuracy and Data Quality

A margin figure is a calculation on charges, so it inherits their quality. The data quality literature treats accuracy as one of several dimensions on which data users judge fitness for use [17], and it reports that poor-quality data carry real costs that organizations often do not see [13]. For an LSP, the charges on the forwarding order are the data on which every margin figure rests.

2.4 Research Gap, Questions, and Propositions

The sources above describe providers, cost assignment, and data quality. None that we found examines how a transportation management system keeps the sell side and the buy side of a transaction on one document, or what that does to margin visibility. This paper addresses the gap with three research questions.

RQ1. Which features of the forwarding order change what the provider can charge, what it will be charged, or when either is known?

RQ2. How does buy-side cost reach the forwarding order, and when is margin per order available?

RQ3. What does a documented deployment show about the role of charge accuracy at the document level?

The framework is simple. Margin per order is sell-side charges minus buy-side charges. It can be read on the order only if three conditions hold. Both sides are attached to the order (P1). Buy-side cost is attributed back to the order in time to act on (P2). The charges on both sides are accurate (P3). We use P1 to P3 as propositions, not statistical hypotheses, because the study is descriptive and tests nothing statistically.

3. Methodology

3.1 Research Design

The study is a descriptive, design-level analysis supported by one documented case. It borrows from design science research, which judges an artifact by what it is built to do [6], [11], and from case study research, which uses a single case to illustrate and probe a mechanism [5], [18]. It does not test hypotheses.

3.2 Object of Study and Sources

The object of study is the forwarding order in SAP TM. Three sources supplied the material: the vendor's application documentation [14], a reference text on the system [10], and the configuration and project records of the deployment described in Section 8.

3.3 Selection Logic

A feature was included when it changes what the provider charges the customer, what carriers or internal units charge the provider, or when either figure becomes known. Features that serve only execution, such as vehicle scheduling, were left out unless they touched one of those three. The included features were grouped into the three areas described in Sections 4 to 6, and each was traced to margin.

3.4 Case Selection and Data

One deployment was used: the North America operations of a large global transportation company. It was chosen because it is documented and because its problem, settlement disputes caused by charge-calculation defects, bears directly on RQ3. The data are two counts: the weekly inflow of new settlement disputes and the size of the backlog.

3.5 Population, Sampling, and Instruments

The study analyzes a system design and one deployment. It therefore has no target population, no sample of respondents, and no survey instrument. Sampling here means the selection of features and of the case, described in Sections 3.3 and 3.4. The instruments are the selection

rule in Section 3.3 and the comparison of each claim with the documentation and configuration. Validity rests on that comparison and on stating the limits openly (Section 9.4).

4. The Forwarding Order Document

Sections 4 to 6 describe the forwarding order as implemented in SAP TM [10], [14]. Each ends by naming its link to margin.

4.1 Types and User Interfaces

A logistics service provider operates globally and across every mode, and each mode carries information the others do not. The forwarding order accommodates this through its type, which determines the user interface presented and whether charge calculation and settlement are enabled on the order. A general interface serves road and rail; a mode-specific interface, for air, for example, exposes the fields that mode requires. Type is therefore not a cosmetic choice but a declaration of what kind of transaction the order represents and how it will be priced. For margin, type matters first: it decides whether charge calculation is enabled, and an order that cannot calculate charges cannot carry a sell side.

Capturing an order is a lengthy act, because a complete forwarding order carries a great deal: items, locations, dates, routing, and the contractual detail that governs the service. Providers rarely have the luxury of entering all of it while a customer waits on the phone. A fast entry interface answers this: one that exposes only the essentials the customer actually supplies, items, locations, and dates, so the order can be booked quickly and enriched later with the contractual and procedural detail. Fast entry itself varies by mode, surfacing, for instance, the handling codes that air transportation requires. Order capture is, by design, a two-speed activity: fast while the customer is present, thorough once the commitment is made. Fast entry touches margin only indirectly. An order booked on essentials can be priced only on what those essentials carry, so details added later can change the charge.

4.2 The Sales Organization and the Selling Relationship

What marks the forwarding order as a selling document rather than a buying one is its connection to a sales organization. In a provider running both the transportation system and an ERP back end, the sales organization integrates at two points. First is the forwarding agreement, the long-term contract that represents the selling relationship with a customer and that requires a sales organization to exist at all. Second is settlement: the provider settles with its ordering parties by raising a forwarding settlement document and routing it to ERP for financial posting. Both points are on the sell side, which is the point. A forwarding order is anchored, from the start, to the commercial relationship it is meant to profit from. The agreement matters for margin because its calculation sheet holds the sell-side price rules, as Section 7 shows.

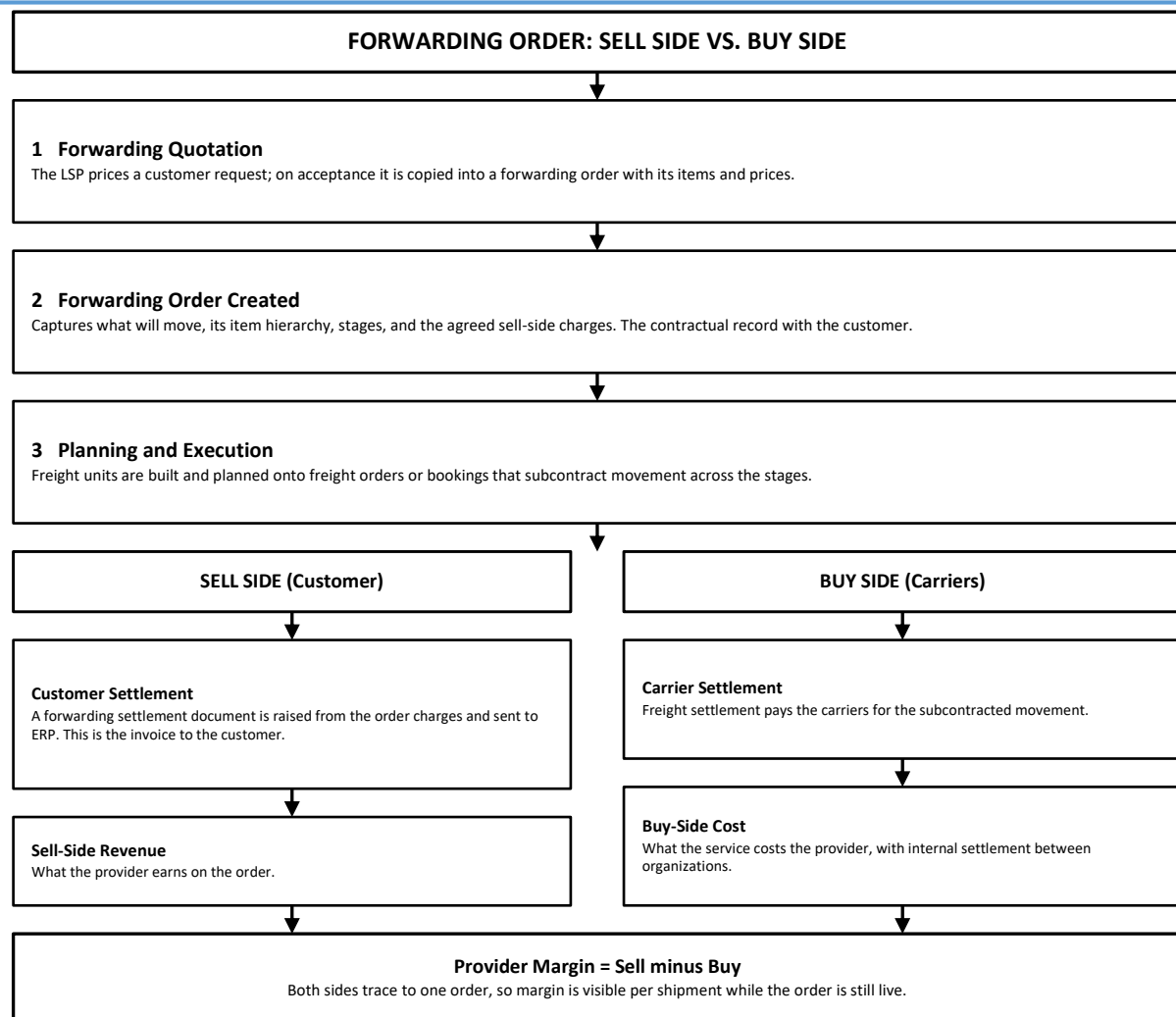


Figure 1: The forwarding order split into its two financial sides: a shared trunk (quotation, order, planning) forks into the sell side (customer settlement, revenue) and the buy side (carrier settlement, cost), rejoining at the provider margin.

5. Representing the Goods: Item Hierarchy

5.1 Why the Hierarchy Exists

Goods are rarely shipped as bare products. They are packed, and the packing changes their weight and volume, which are exactly the quantities that drive both price and capacity. A forwarding order therefore represents what moves not as a flat list but as a hierarchy that mirrors the real packing. At the top sits a passive vehicle resource, the trailer or railcar itself, when the customer hands over something already loaded; where none is supplied, a container takes the top. A container holds packages, a package may hold further packages, and products sit at the bottom. Net product weight propagates upward, adding to the tare weight of each package and container it is nested within, so the gross figures the order carries reflect the real loaded weight rather than the bare goods.

Hierarchy here is not only a representation; it is a constraint that flows downstream. Items contained within one superordinate item, everything inside a given container, cannot be split

when freight units are later created. Packing structure thus decides what can and cannot be planned separately, which means a modeling choice made at order entry propagates all the way into how the movement can be executed. Representing the goods accurately is therefore not bookkeeping; it is a planning decision taken early. It is also a pricing decision, as the example in Section 5.3 shows.

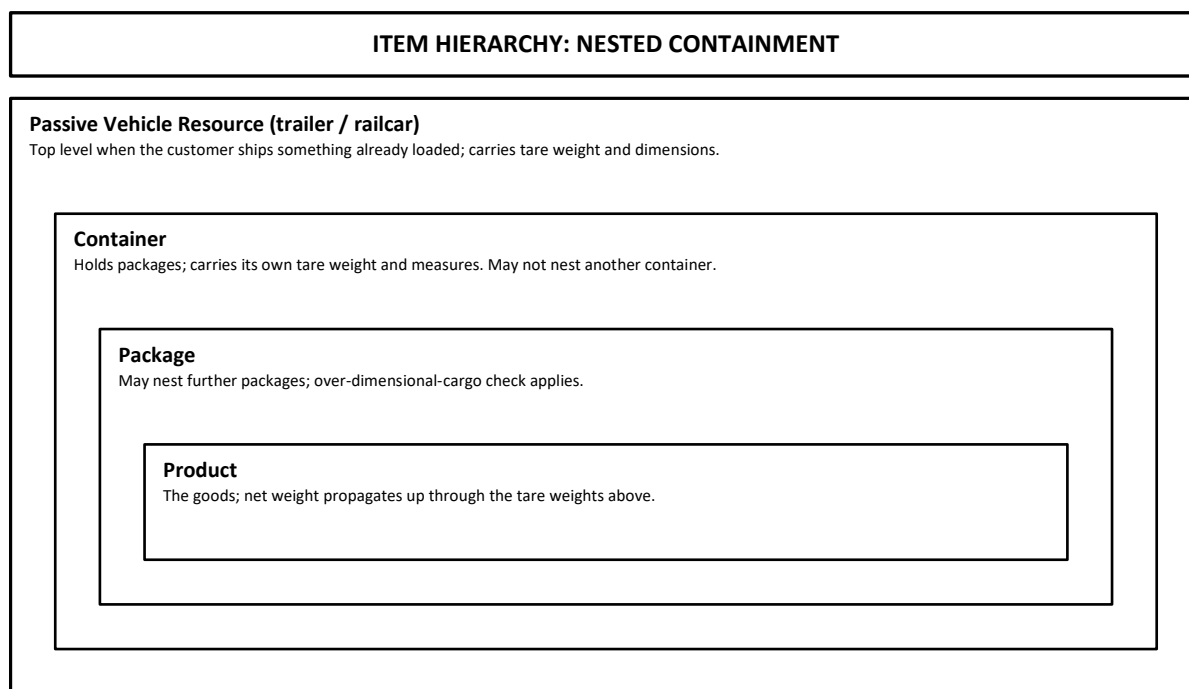


Figure 2: The item hierarchy shown as nested containment: a passive vehicle resource holds containers, which hold packages, which hold products, with net weight propagating outward through the tare weights.

5.2 The Five Item Categories

Every item on a forwarding order belongs to one of five categories, and each carries different information because each plays a different role. A passive vehicle resource carries the tare weight and dimensions of the trailer or railcar it stands for. A container carries its own tare weight and measures and may hold packages but never another container. A package may nest further packages and triggers an over-dimensional-cargo check where configured. A product carries the net weight that anchors the whole propagation. A service item carries no goods at all; it is a priced line, such as customs handling or insurance, that contributes to the order value without occupying the packing hierarchy. These categories are what let a single document describe a loaded trailer, the boxes inside it, the goods inside those, and the services wrapped around the whole shipment, all at once.

Table 1: The five forwarding order item categories, what each may contain, and the key information it carries into pricing and planning.

Item Category	Can Contain	Key Information Carried
Passive Vehicle Resource	Containers, packages, products	Trailer or rail-car tare weight, length, width, height from the resource type.
Container	Packages, products	Tare weight and measures from a default equipment type; no nested containers.
Package	Further packages, products	Over-dimensional-cargo check; tare weight added to propagated net weight.
Product	Nothing (leaf)	The goods and their net weight, the base of the weight propagation.
Service	Nothing (leaf)	A service line with a text schema; priced but not physically packed.

5.3 Worked Example: From Hierarchy to Margin

A hypothetical order shows the link. Two pallets travel by air. Pallet 1 holds 120 kg of net product and has a tare weight of 25 kg. Pallet 2 holds 90 kg and also has a tare weight of 25 kg. Each pallet measures 1.68 m³. The calculation sheet of the forwarding agreement charges the greater of gross weight and volumetric weight, at 167 kg per cubic meter. The customer rate is USD 2.40 per kg. The carrier bills USD 1.85 per kg on the weight it measures, 561 kg. All figures are invented to show the mechanics. They are not data from the case in Section 8.

With the hierarchy entered, the order carries 260 kg gross weight and 3.36 m³. Volumetric weight, about 561 kg, governs. The sell charge is USD 1,346.40 against a buy charge of USD 1,037.85. If the order is entered as bare goods, 210 kg and no volume, the sell charge falls to USD 504.00. The carrier still bills USD 1,037.85, and the order loses USD 533.85. The shipment, customer, and carrier are the same. Only the packing structure differs. Weight propagation sets the sell charge and the buy-side exposure together, which is why the hierarchy is a margin matter and not only a planning matter.

Table 2: Hypothetical order showing how the item hierarchy changes chargeable weight, charges, and margin (USD).

Measure	Hierarchy entered	Entered as bare goods
Gross weight	260 kg	210 kg (net only)
Volume captured	3.36 m ³	None
Chargeable weight	561 kg (volumetric)	210 kg
Sell charge at 2.40 per kg	1,346.40	504.00
Buy charge at 1.85 per kg on 561 kg	1,037.85	1,037.85
Margin	308.55 (22.9% of sell)	-533.85 (-105.9% of sell)

6. Stages, Movement, and the Order-to-Settlement Chain

6.1 Stages and Movement Types

A forwarding movement is rarely a single leg. It is a sequence of stages, and the stage model is how the order represents a journey that may begin with a local pickup, cross an ocean, and end with a local delivery. Three stage types recur: pre-carriage, main carriage, and on-carriage. Movement type describes the geographical shape of the whole journey, door-to-door or port-to-port being common examples, and it determines which stages occur and which are mandatory. Main carriage is mandatory and is the stage the system proposes by default; pre-carriage and on-carriage are optional, appearing when the movement type calls for them. Shipper and consignee on the order feed the origin and destination, so the journey endpoints come from the commercial parties rather than being keyed a second time.

Stages matter financially as well as operationally, because each stage can be made relevant for internal settlement at a different point in its execution. One stage may become settlement-relevant when it is ready, another when it is in execution, another only once executed. An order carries both an ordered route and an actual route: the ordered route, set when the order is taken, is what charge calculation uses in most cases and what the customer-facing settlement is built on, while the actual route records what planning actually did. Keeping both means the provider can bill the customer for what was agreed while still tracking what was really done, and can see where the two diverge. The two routes also explain one kind of margin leak: the customer pays for the ordered route, while carriers charge for what was actually moved.

Table 3: The stage sequence defined by movement type, showing which stages are optional or mandatory, which is proposed by default, and when each becomes relevant for internal settlement.

Stage	Occurrence	Propose Stage	Internal Settlement
Pre-Carriage	Optional	No	When ready
Main Carriage	Mandatory	Yes	When in execution
On-Carriage	Optional	No	When executed

6.2 From Quotation to Settlement

Commercial life for a forwarding order begins before the order exists, with a quotation. A provider prices a customer request as a forwarding quotation, and if the customer accepts, the quotation is copied into a forwarding order that carries its items and agreed prices forward. From there the order is planned, freight units are built from its items, and those units are planned onto freight orders or freight bookings that subcontract the physical movement. Execution runs across the stages, and when it is time to bill, a forwarding settlement document is raised from the order charges and passed to ERP for posting. That chain is continuous, quotation to order to execution to settlement, and the agreed prices ride it the whole way. The margin link is continuity. Because the quotation price is copied into the order and carried to settlement, the sell side is fixed early while the buy side is still forming. That gap is the exposure the provider manages.

A quotation is a price. An order is a promise. A settlement is the proof the promise paid.

6.3 Summary: How Each Feature Touches Margin

Table 4 collects the links named in Sections 4 to 6. Two features, order type and fast entry, touch margin only indirectly. They stay in the description because the order cannot exist without them, but the argument of this paper does not rest on them.

Table 4: Forwarding order features, the decision or step each affects, and the direction of its effect on margin.

Feature	Decision or step affected	Side	Effect on margin
Order type and interface	Whether charge calculation and settlement run on the order	Sell	Indirect; enables or disables the sell side
Sales organization and forwarding agreement	Source of sell-side price rules; target of customer settlement	Sell	Direct
Item hierarchy and weight propagation	Chargeable weight; what can be split in planning	Both	Direct (Table 2)
Service items	Priced lines such as customs handling or insurance	Sell	Direct; adds revenue without goods
Stage model and movement type	Which legs exist; when each becomes settlement-relevant	Both	Direct, through the timing of cost
Ordered and actual route	Basis of customer billing versus record of execution	Both	Direct; the gap shows leakage
Quotation-to-settlement chain	Carries agreed prices through to the invoice	Sell	Direct
Cost pull	Which execution charges become customer revenue	Boundary	Direct

7. Two Sides of One Order: Where Margin Lives

7.1 The Sell Side, the Buy Side, and Margin per Order

A forwarding order is where two financial flows meet, and keeping them on one document is the intent of the design. On the sell side, the charges agreed with the customer settle through a forwarding settlement document, which stands as the invoice issued to that customer and the source of the revenue posted to ERP. On the buy side, the same movement is subcontracted to carriers whose charges are settled through freight settlement, and where the movement crosses internal organizations, through internal settlement that recovers cost from one unit to another. The sell side is what the provider earns; the buy side is what the service costs it.

This paper defines provider margin as gross margin per order: sell-side charges minus buy-side charges, where buy-side charges include carrier charges and internal settlement. It excludes overhead, claims, currency effects, and period accruals. This is narrower than the margin on an income statement, and it is the only kind of margin an order can carry.

How buy-side cost reaches the order matters, because carriers are not charged on the forwarding order. Their charges are calculated on the freight order or freight booking that subcontracts the movement, and they are settled through freight settlement. For the margin to be read on the forwarding order, the cost of the execution document has to be assigned back to the forwarding orders it carries. SAP TM does this through cost distribution [10], [14]. A freight order that carries one shipment passes its cost to one forwarding order. A freight order

that consolidates several shipments shares its cost among them by a distribution key such as gross weight or volume.

Timing matters as much as mechanism. The buy-side figure passes through three states. It is an estimate when the movement is planned, because it comes from carrier rates in charge calculation. It is updated as stages are executed and become settlement-relevant. It is final only after the carrier's charges are settled, which often happens after execution. Margin per order while the order is live is therefore an estimate. Its quality depends on the carrier rate data, and late carrier invoices can move it.

Even as an estimate, the figure is useful. A provider that can see estimated margin per order can decline unprofitable business before accepting it, price the next similar order better, and catch a lane whose buy cost has crept above its sell price before it has done so a thousand times. The estimate is a property of the document, not an accounting abstraction computed after the period closes.

7.2 Cost Pull and Charge Attribution

Not every cost the provider incurs is meant to stay on the provider books; some are agreed to be passed through to the customer. A cost pull mechanism handles this, by which charges incurred on an execution document are pulled onto the forwarding order so they can be billed to the customer. A pull can be aggregated, where several execution charge lines collapse into a single order charge line through an instruction set in the calculation sheet of the forwarding agreement, or itemized, where the individual lines are carried onto the order and taken up by the settlement document. Aggregated pull shows the customer one clean line; itemized pull preserves the detail. Either way, the mechanism decides which costs become customer revenue and which stay provider cost, which is precisely the boundary that defines margin. Deciding which costs are assigned to a customer is a cost assignment rule, and the costing literature has shown for decades that such rules, and not only the underlying costs, determine reported profitability [3], [12].

This is where accurate charge handling at the document level stops being a technicality and becomes the margin itself. A charge pulled that should not have been, or omitted that should have been pulled, moves the boundary between cost and revenue and therefore changes the margin directly. A provider that handles charges correctly on the order bills what it agreed and recovers what it is owed; the provider that handles them loosely leaks margin one misattributed charge at a time, invisibly, because each individual error is too small to notice and only the aggregate is large. Research on data quality makes a related point: poor-quality data carry real and often hidden costs [13], and accuracy is only one of several dimensions on which users judge data [17].

Every misattributed charge moves the line between cost and revenue.

8. Results and Findings

8.1 Findings from the Design Analysis

The analysis answered the first two research questions as follows.

Finding 1 (RQ1). Three design elements carry margin directly. The item hierarchy sets chargeable weight on both sides (Section 5.3). The stage model, with its ordered and actual routes, sets when cost is recognized and exposes any gap between what was sold and what was done (Section 6.1). The cost pull sets the boundary between customer revenue and provider cost (Section 7.2). Other features, notably order type and fast entry, affect margin only indirectly (Table 4).

Finding 2 (RQ2). Buy-side cost reaches the forwarding order through distribution from execution documents. Margin per order therefore exists in the system as a staged estimate, from planning to final settlement (Section 7.1). The estimate can support decisions before and during execution. It cannot replace final margin.

These findings agree with prior work in two ways. First, the rule that turns a packing structure into chargeable weight behaves like a cost driver in activity-based costing: the rule that converts a physical quantity into a charge decides what a transaction appears to earn [3], [7], [12]. Second, the finding that estimated margin depends on rate data quality fits the data quality literature [13], [17]. The studies cited address costing in general or logistics at the firm level. As far as we found, none tests an order-level design inside a transportation management system. The agreement is one of principle, not of direct evidence.

8.2 The Documented Deployment

Finding 3 (RQ3). A dependency makes this work: charge accuracy at the document level. Margin per order is only as trustworthy as the charges on the order, and the forwarding settlement document that bills the customer inherits whatever those charges say. If the sell-side charges are wrong, the provider invoices incorrectly and either loses revenue or triggers a customer dispute; if the buy-side charges are wrong, the computed margin is fiction. That cost pull boundary, which decides what becomes revenue and what stays cost, has to be configured and applied correctly or the margin figure is wrong in a way no downstream report can detect, because the error is upstream of every report.

The deployment studied is at the North America operations of a large global transportation company. Charge-calculation defects at the document level, concentrated in a specific family of fees, were generating settlement disagreements that reconciliation could not keep pace with. The team corrected the charge handling at its source instead of resolving the disagreements one by one downstream. After the correction, new settlement disputes fell at a sustained rate of about nine percent per week, and an accumulated backlog fell from about 4,000 cases to under 400, a reduction of more than ninety percent. The case measured disputes. It did not measure margin. We read it as evidence that document-level charge accuracy can be restored and that doing so removes a recognized source of margin error. We do not read it as proof that margin rose. Table 5 summarizes the outcomes.

Table 5: Evidence from the documented deployment on document-level charge accuracy.

Dimension	What it depends on	Evidence in the case
Sell-side invoice accuracy	Correct charges on the forwarding settlement document	Not measured directly; dispute inflow serves as a proxy
Buy-side cost accuracy	Correct carrier and internal settlement charges	Not measured
Settlement dispute inflow	Charge accuracy at the source, not downstream reconciliation	New disputes fell about 9% per week, sustained
Accumulated backlog	Correcting the cause rather than processing symptoms	Reduced by more than 90% (from about 4,000 cases to under 400)
Margin integrity	The cost-revenue boundary set by correct charge attribution	Inferred from the two rows above; not measured

8.3 Reading the Evidence

For a shipper, a charge error is a cost error: transportation becomes a little more expensive than it should be. For a provider, a charge error can be a margin error, because the same charge sits on the boundary between what is billed and what is borne. In our reading, this is why document-level charge accuracy matters more in a forwarding business, not less. Prior work on data quality [13], [17] and on cost assignment [3], [12] predicts the same pattern. We know of no study that reports order-level evidence for LSPs, so a single case should be read as an illustration and not as a test.

9. Discussion

9.1 Margin Visibility as a Design Property

The argument of this paper is that margin visibility is a design property, not a reporting exercise. A report built after settlement can describe only margin already made or lost. Attaching both financial sides to the forwarding order makes an estimate visible while the order is live, which is when something can still be done. The findings support that statement about visibility. They do not test the further claim that earlier visibility makes the provider more profitable.

9.2 The Counter-Position

ERP profitability analysis, business intelligence tools, and cost-to-serve models can also report margin [3], [7], and some can do so close to real time. Order-level visibility in the transportation system has an edge under specific conditions. It does not need to rebuild the link between a carrier charge and a customer order, because the link is made when cost is distributed. It is available before the provider accepts business, when the quotation is priced. And it uses the same charges that will be invoiced, so the sell side cannot drift from what the customer is billed.

The edge shrinks under other conditions. If carrier rate data are poor, the estimate is poor. If carrier invoices arrive late or carry accessorial charges nobody planned for, final margin will

differ from the live figure. If costs are shared across many orders, such as a linehaul contract paid per period, any distribution key is a judgment, and a BI model with different keys may be just as defensible. Overheads, claims, and customer-level profitability sit outside the order altogether, and ERP and BI models handle them better. The two approaches complement each other. The transportation system supplies the early, per-order estimate. ERP and BI supply final and period-level margin.

9.3 Implications for Practice and Policy

For practitioners, the implications are direct. Capture the item hierarchy completely at order entry. Keep both financial sides on the order. Configure the cost-pull boundary deliberately. Guard the charge accuracy on which every margin figure depends. For finance policy, three rules follow: define which margin the order carries, give the cost-pull configuration an owner, and reconcile estimated margin to final margin when carrier charges are settled.

9.4 Limitations and Generalizability

The study has five limits. It describes one system. It uses one deployment, and that deployment is the authors' own, so the authors are not independent observers. The case measured disputes, not margin. The design analysis rests on documentation and configuration, not on an experiment. And the figures in Section 5.3 are hypothetical. Other transportation management systems may or may not hold sell and buy documents separately, distribute cost to the sell-side order, or expose both on one screen. The framework carries over to those that do. Future work should use several deployments, compare estimated with final margin per order, and test order-level visibility against ERP profitability analysis.

10. Conclusion and Recommendations

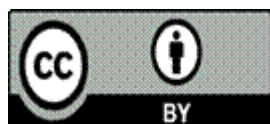
A logistics service provider earns its living in the spread between what it sells transportation for and what it pays to deliver it. This paper asked where a transportation management system keeps that spread. The answer is the forwarding order, because it is the document on which both sides can be read together. The answer is narrower than the claim the paper began with. Three design elements carry margin directly. Buy-side cost reaches the order by distribution, so margin per order is a staged estimate. And in the one deployment studied, restoring charge accuracy at the document level cut settlement disputes and cleared most of a large backlog.

Four recommendations follow. First, capture the item hierarchy completely at order entry, because it sets chargeable weight on both sides. Second, configure the cost-pull boundary deliberately and give it an owner. Third, treat live margin as an estimate: label it as one, and reconcile it to final margin when carrier charges are settled. Fourth, guard charge accuracy at the source, because every margin figure inherits it.

For a forwarder, the document is not only the record of the work. It is where the profit shows up.

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