



Harvesting / Transportation No. 2

OptiLog is a collaborative project between the ITC, Coillte and COFORD. It is an efficiency analysis of the sale, purchase, harvesting and haulage of timber in the Irish forestry sector.

This note presents an overview of the OptiLog project and the principal recommendations for a phased evolution of the timber supply chain into a more streamlined and cost effective process, characterised by optimal utilisation of our timber harvesting, haulage and supply chain management resources.

The project's principal objectives are:

- ▶ to identify areas of cost and operational inefficiency in the timber supply chain,
- ▶ to understand and elaborate the reasons for such inefficiencies and
- ▶ to develop strategies to overcome identified inefficiencies.

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Considerable savings possible by planning harvesting systems

Mark Tarleton¹ and Henry Phillips²

Analysis of the component processes of the timber supply chain has highlighted a range of efficiency issues relating to the current configuration of the supply chain and the resultant interaction of supplier, purchaser and harvesting and haulage contractors. Figure 1 gives an overview of the component processes of the timber supply chain based on 2001 process cost data. Each component cost has been presented as a percentage of the total estimated cost associated with the timber supply chain. The supply chain process costs were assessed in the context of issues such as cost drivers, cost interdependence, process (and cost) repetition, inherent process efficiencies/inefficiencies, and presence and implications of any

cost pressures/trends upwards or downwards.

Inflationary pressures associated with both harvesting and haulage operations are primarily attributable to wage inflation, insurance premium inflation, requirements for compliance with new health and safety and environmental standards and, in the case of haulage operations specifically, requirements for compliance with gross weight and tachograph legislation.

The timber supply chain is an integrated process with cost interaction and interdependence. The interdependence of many of the supply chain processes and their inherent cost structures are dictated by the industry's prevailing systems

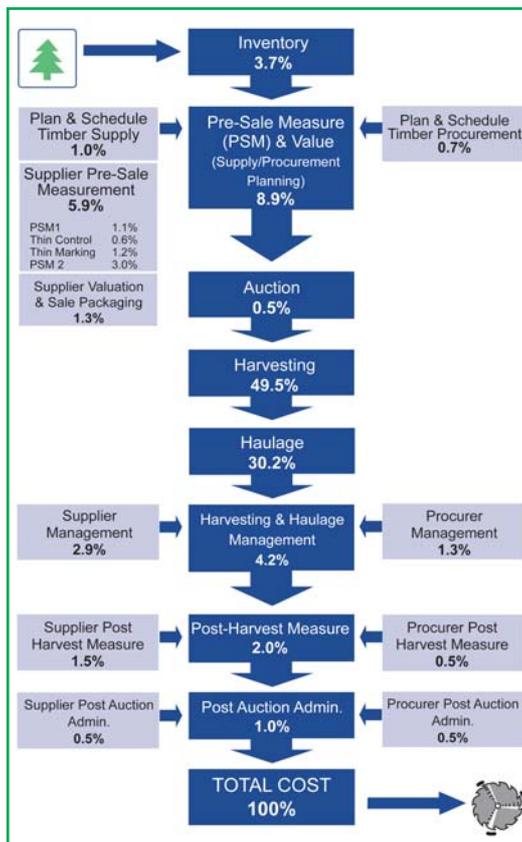


FIGURE 1: Flowchart of component processes of timber supply chain based on 2001 process cost data.

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of timber sales planning and product offering. The principal issues affecting the efficiency of the prevailing timber supply chain are:

The dual system of timber supply

There are two systems of timber supply ('harvested' and 'standing') currently operating in a relatively small forest industry by international standards. Both systems have their own support and management infrastructure and associated overheads. This fragmented, non-integrated dual system is demanding excessive management and administrative overheads and is precluding process integration within large scale harvesting and haulage logistical planning and management, resulting in duplication of effort and process inefficiency. It is resulting in sub-optimal utilisation of our harvesting and haulage infrastructure. Harvesting and haulage contractors operating in this environment have very limited scope for logistically efficient operational planning.

This logistical gap is being exacerbated by the fact that some harvesting contractors can have strong allegiances to Coillte and/or specific sawmills, reducing the possibility for regionally focused harvesting operations. Timber sales are currently being harvested side-by-side by different harvesting contractors due to contractor allegiance and poor levels of inter-mill co-operation. This inefficiency carries through to inefficiencies in harvesting and haulage management and supervision.

Relatively small sale sizes with low levels of geographic focus

The prevalence of small sales within the current timber supply system reduces the potential for economies of scale and overhead reduction in all aspects of supply and procurement. Timber sale size and location in relation to other contracted workloads is seen as a major factor influencing the efficiency and cost of harvesting operations. Individual forest properties are often scheduled for timber harvesting annually. Sale volumes are often small and isolated and distributed through the timber supply system among many timber procurers employing different harvesting and haulage contractors. This is adding to the continuous dispersal and fragmentation of our harvesting and haulage infrastructure. There is a wide spread perception that logistical efficiencies and economies of scale could be gained by a restructuring of timber supply planning systems to facilitate more geographically and

temporally focused harvesting operations.

Short lead in time to timber sales

Under the current timber supply system, only a very low level of logistical planning is possible within an individual sawmill's management of its harvesting contractor infrastructure. This is due to a lack of information relating to the geographic distribution of its future harvesting requirements. The 'drip-feed' nature of the current timber supply system fosters a start/stop approach to harvesting infrastructure management and an often illogical and inefficient use of contractor resources and management time when analysed in hindsight. Procurement managers and harvesting contractors find themselves re-visiting forest properties within very short periods resulting in excessive low-loading and set up costs, high levels of downtime and excessive management overheads.

Sawmills require a clear picture of the geographic distribution of their future timber supply in order to develop logistically efficient supply planning systems. Under the current timber supply system, this is not available. Therefore, timber supply cannot always be logistically sourced in the context of individual sawmill location and procurement contracting and management infrastructure.

The SP based timber supply system

The current practice of linking product sales to specific geographic locations precludes the levels of flexibility required to fully optimise efficiencies in supply allocation.

Definitive pre-sale mean tree valuation

In standing sales, there is a requirement for detailed and costly pre-sale stand assessment for reserve price computation. Basing a definitive €/m³ pre-harvest bid on mean tree assortment estimates requires the compilation and analysis of detailed stand parameter data. This is a costly exercise, involving duplication of effort due to timber procurers' requirements to verify and augment Coillte measurement data prior to auction. The supplier and several prospective purchasers will visit, measure and value standing sales.

Low levels of appropriate IT usage

There is currently a relatively low level of IT usage within the timber supply chain, particularly in the areas of timber

sales administration, haulage management and logistics, timber measurement and control and monitoring of harvester production. Considerable time and money is spent compiling and analysing information manually and verbally. There is a requirement to follow international best practice (e.g. Finland) and move to an IT based system of timber supply chain information collection and transfer. This would facilitate efficient real time management of the timber supply chain and provide the potential for industry supply chain integration in order to avail of economies of scale and logistical efficiencies.

OptiLog Strategy

The OptiLog project has concluded with the preparation of a phased strategic plan for the reconfiguration of the timber supply chain with the principal objectives of improving efficiencies and reducing unit cost. If implemented, such a plan would help to ensure the phased evolution of the timber supply chain into a more streamlined and cost effective process, characterised by optimal utilisation of our timber harvesting, haulage and supply chain management resources. Figure 2 presents an overview of the strategic plan, showing its component phased objectives and

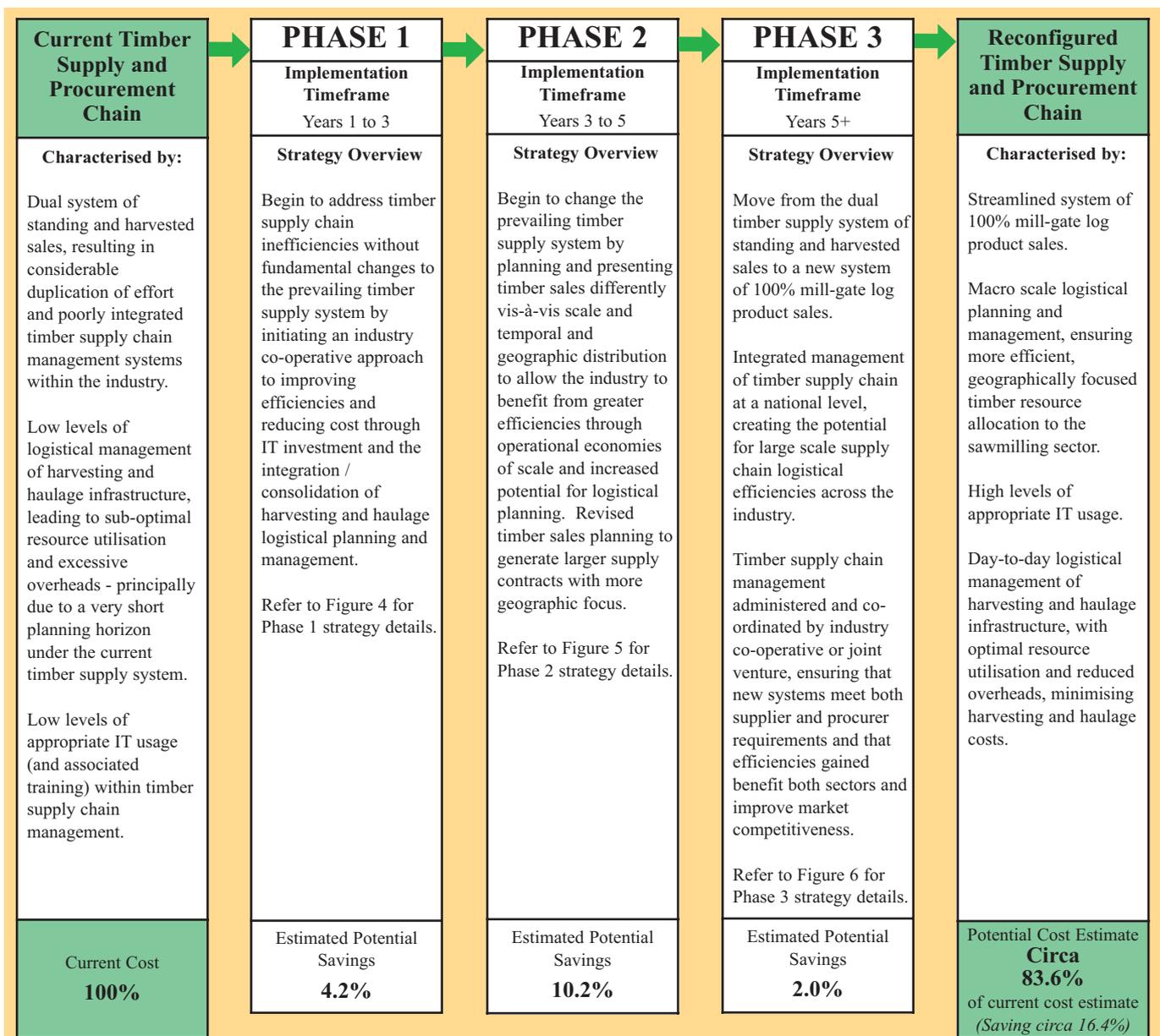


FIGURE 2: Overview of OptiLog strategy.

associated estimates of potential cost savings (presented as a percentage of current cost estimates).

The strategy addresses specific process inefficiencies due to information technology gaps, sub-optimal transaction scale, logistical shortcomings etc., and fundamental supply and procurement chain inefficiencies due to the constraints of the prevailing timber supply system and its rigidly defined, geographically linked operation between supplier and procurer.

The strategy is presented in three phases, each based on incremental change to the prevailing timber supply system and increasing levels of industry integration within our timber supply chain management systems. There is considerable potential to capitalise on the logistical flexibility of a timber supply system that is based on mill-gate log product supply.

The objective of the proposed strategic plan is a move towards a streamlined system of mill-gate log product sales allowing macro scale logistical planning and management of timber supply and ensuring more efficient, geographically focused timber resource allocation to the sawmilling sector. Such a system would be characterised by high levels of appropriate IT use, facilitating real time logistical management of our harvesting and haulage infrastructure, with optimal resource utilisation and reduced operational and management overheads.

Phased changes to current supply chain systems have been grouped into the following four categories:

1. Changes to current systems of timber supply planning;
2. Changes to current systems of timber supply chain information capture and flow;
3. Changes to current timber measurement systems;
4. Changes to the current industry structure of timber supply chain management.

Figure 3 summarises the required changes or objectives within each category for each of the three strategic phases.

Phases 1, 2 and 3

Figures 4, 5 and 6 on the following pages present an overview of the three phases of the OptiLog strategy, showing their component objectives and summarised estimates of potential unit cost savings.

OptiLog Strategy	Phase 1 Objectives	Phase 2 Objectives	Phase 3 Objectives
Timber supply planning	Increase average lot size Eradicate costly timber marking operations Begin to develop system of more logistically planned supply	Conclude development of system of more logistically planned supply	Optimise system of more logistically planned supply
Timber supply chain information capture and flow	Initiate IT investment and training	Conclude IT investment and training	-
Timber measurement systems	Streamline timber measurement systems	Further streamline timber measurement systems	-
Industry structure of timber supply chain management	Begin to plan Phase 3 operational structures for optimal supply chain management of 100% mill-gate log product supply	Develop integration of industry's supply chain logistics Begin move towards system of 100% mill-gate log product supply	Optimise integration of industry's supply chain logistics Continue move towards system of 100% mill-gate log product supply

FIGURE 3: Summary of OptiLog strategy objectives.

Phase 1 of the strategy requires no fundamental changes to the prevailing timber sales system and begins to address timber supply chain inefficiencies by:

- ▶ Beginning the process of developing an industry co-operative approach to improving efficiencies and reducing costs through co-operative IT investment and the integration / consolidation of harvesting and haulage logistical planning and management.
- ▶ Beginning to streamline both pre-sale and post-harvest measurement operations.
- ▶ Beginning to develop new structures and systems to facilitate a move towards Phases 2 and 3.

Although this phase will yield some moderate unit cost savings, it is primarily associated with investment in IT and training in order to facilitate supply chain efficiencies in Phases 2 and 3.

OptiLog Strategy Phase 1	Implementation Timeframe - Years 1 to 3	
	Objectives	Potential Savings (%)
Timber supply planning	Increase Average Lot Size: Move to larger timber sale sizes through consolidation of existing timber sales planning structures. <ul style="list-style-type: none"> - Review system of timber sale creation and remodel to facilitate volume amalgamation wherever possible. - Set larger minimum lot sizes. - Monitor average lot size over time. 	Potential for some savings through reduced pre and post auction administration.
	Eradicate Costly Timber Marking Operations: Move to harvested sales for all thinnings to facilitate system of 100% unmarked thinning operations. <ul style="list-style-type: none"> - Move to 100% contractor select thinning operations. - Eliminate pre-harvest marking of thinnings. 	Eliminate thin marking cost. Circa 1.2%
	Begin to Develop System of More Logistically Planned Supply: Begin to update timber sales planning systems with the objective of presenting timber to the market in a more logistically efficient manner over time. <ul style="list-style-type: none"> - Develop timber sales planning system to generate larger scale sales / supply contracts within geographically focused areas. - Begin to plan temporal and geographic distribution of sales with harvesting contract operational efficiency in mind. 	Real savings from more logistically planned supply would probably not be capitalised until full implementation in Phase 2.
Timber supply chain information capture and flow	Initiate IT Investment and Training: Initiate strategy to improve efficiency of supply chain management through greater use of available information technology. <ul style="list-style-type: none"> - Upgrade IT hardware and software in harvesting and haulage fleet - initially in pilot quorum (10%). (Explore Forest Service funding possibilities.) - Develop Forest IT information and training programme (harvesting contractors, haulage contractors and supply chain managers). - Introduce intranet link between Coillte and the processing sector for more streamlined supply chain administration. - Develop comprehensive, industry owned IT platform (and data standard) for more efficient, industry integrated management of supply chain logistics, available for supply chain management of both standing and harvested sales. (Explore funding possibilities: Forest Service, Enterprise Ireland, NITL.). 	Real savings from greater use of IT would probably not be capitalised until full implementation in Phase 2.
Timber measurement systems	Streamline Timber Measurement Systems: Move to more streamlined pre-sale and post-harvest timber measurement systems. <ul style="list-style-type: none"> - Change pre-sale measurement procedure for harvested sales to a single visit (PSM1). - Streamline post-harvest volume/weight measurement system through greater use of technology. - Begin to consider move to industry co-ordinated post-harvest volume/weight measurement system. 	PSM2 cost down by circa 70%. Post-harvest volume/weight measurement cost down by at least 40%. Circa 3.0%
Industry structure of timber supply chain management	Begin to Plan New Optimal Supply Chain Management Structures: Begin to plan Phase 3 operational structures for optimal supply chain management of 100% mill-gate log product supply. <ul style="list-style-type: none"> - Begin to plan development of new structures and systems for industry integration of harvesting and haulage logistical planning and management. 	Real savings from more integrated supply chain management would probably not be capitalised until full implementation in Phases 2 and 3.

FIGURE 4: Summary of OptiLog strategy - Phase 1.

OptiLog Strategy Phase 2	Implementation Timeframe - Years 3 to 5	
	Objectives	Potential Savings (%)
Timber supply planning	<p>Conclude Development of System of More Logistically Planned Supply: Conclude update of timber sales planning systems. Present timber to the market in a more logistically efficient manner.</p> <ul style="list-style-type: none"> - Offer larger scale sales/supply contracts within geographically focused areas. - Plan temporal and geographic distribution of sales with harvesting contract operational efficiency in mind. 	<p>Reduced harvesting operational overheads and increased machine utilisation.</p> <p>Circa 3.8%</p>
Timber supply chain information capture and flow	<p>Conclude IT Investment and Training: Conclude strategy to improve efficiency of supply chain management through greater use of available information technology.</p> <ul style="list-style-type: none"> - Conclude upgrade of IT hardware and software in national harvesting and haulage fleet – using findings from Phase 1 pilot upgrade. (Explore Forest Service funding possibilities.) - Conclude Forest IT information and training programme (harvesting contractors, haulage contractors and supply chain managers). 	<p>Harvesting machine productivity up circa 5%.</p> <p>Operations management down circa 25%.</p> <p>Post auction admin. down circa 50%.</p> <p>Circa 2.8%</p>
Timber measurement systems	<p>Further Streamline Timber Measurement Systems: Further streamlining of pre-sale measurement procedures, with single measurement operation (PSM1) for all sales.</p> <ul style="list-style-type: none"> - Change pre-sale measurement procedure for standing sales to a single visit (PSM1). Verification of PSM1 data at time of harvest and system of unit price adjustment if necessary. - Further consideration of move to industry co-ordinated post-harvest volume/weight measurement system. 	<p>PSM2 cost virtually eliminated.</p> <p>Circa 0.6%</p>
Industry structure of timber supply chain management	<p>Develop Integration of Industry's Supply Chain Logistics: Develop industry integration of harvesting and haulage logistical planning and management.</p> <ul style="list-style-type: none"> - Use industry owned IT platform for more efficient management of supply chain logistics, available for supply chain management of both standing and harvested sales. 	<p>Increased efficiencies through improved logistical planning of haulage (circa 10%).</p> <p>Efficiency potential not 100% exploited until supply chain integration in Phase 3).</p> <p>Circa 3.0%</p>
	<p>Begin Move Towards System of 100% Mill-gate Log Product Supply: Initiate pilot project with new mill-gate log pricing mechanism and new supply chain management structures.</p> <ul style="list-style-type: none"> - Develop trial mill-gate log pricing mechanism for move to mill-gate log product supply. - Design and initiate pilot project among selected sawmills - trial system of mill-gate log product supply under new log pricing mechanism. Initiate under trial Phase 3 business and operational structures for optimal supply chain management of 100% mill-gate log product supply system. Consider supplier/procurer joint venture log supply system. 	<p>Real savings from new, streamlined operational structures for optimal supply chain management would probably not be capitalised until full implementation in Phase 3.</p>

FIGURE 5: Summary of OptiLog strategy - Phase 2.

OptiLog Strategy Phase 3	Implementation Timeframe - Years 5+	
	Objectives	Potential Savings (%)
Timber supply planning	Optimise System of More Logistically Planned Supply: Move from geographically linked MR sale structures to log supply contracts from 'supply regions'. <ul style="list-style-type: none"> - Develop systems of timber supply allocation to sawmills and associated haulage logistics that minimise timber haulage distances and optimise opportunities for 'backloading'. - Reduce haulage distances through a more flexible timber supply system, not limited by pre-determined links between specific forest areas and sawmills. - Further optimise the planning of temporal and geographic distribution of sales with harvesting contract operational efficiency in mind. 	Unknown. However, potential to capitalise further on developed efficiencies.
Timber supply chain information capture and flow	-	-
Timber measurement systems	-	-
Industry structure of timber supply chain management	Continue Move Towards System of 100% Mill-gate Log Product Supply: Review Phase 2 pilot project with new mill-gate log pricing mechanism and new supply chain management structures. <ul style="list-style-type: none"> - Develop industry wide mill-gate log pricing mechanisms that take into account stand value optimisation and relative geographic distribution of log demand and available supply. - Develop business and operational structures for optimal supply chain management of 100% mill-gate log product supply system. 	Timber procurement planning and scheduling minimised. Circa 0.5%
	Optimise Integration of Industry's Supply Chain Logistics: Optimise industry integration of harvesting and haulage logistical planning and management. <ul style="list-style-type: none"> - Introduce a national log supply system with the scale and flexibility to optimise logistical and operational efficiencies within the national timber harvest. 	Further efficiencies through fully industry integrated logistical planning of haulage (circa 5%). Circa 1.5%

FIGURE 6: Summary of OptiLog strategy - Phase 3.

Phase 2 of the strategy requires some changes to the prevailing timber sales system and continues to address timber supply chain inefficiencies by:

- ▶ Planning and presenting timber sales differently vis-à-vis scale and temporal and geographic distribution to allow the industry to benefit from greater efficiencies through operational economies of scale and increased potential for logistical planning. For example, larger supply contracts with more geographic focus.
- ▶ Continuing to develop an industry co-operative approach to improving efficiencies and reducing costs through co-operative IT investment and the integration/consolidation of harvesting and haulage

logistical planning and management.

- ▶ Further streamlining of pre-sale measurement operations.
- ▶ Continuing to develop new structures and systems to facilitate a move towards Phase 3, the development of a streamlined system of 100% mill-gate log product supply.

Estimated cost savings associated with this phase (circa 10.2%) are primarily associated with greater efficiencies within timber supply chain management and more efficient utilisation of our harvesting and haulage infrastructure. Much of these potential savings are dependent on the success of a co-operative approach to timber supply chain

management and may not be fully attainable under the dual system of standing and harvested sales.

Phase 3 of the strategy requires the most radical changes to the prevailing timber sales system and addresses timber supply chain inefficiencies by:

- ▶ Moving from the dual system of standing and harvested sales to a new system of 100% log product sales.
- ▶ Developing the appropriate industry structures to fully integrate the management of the timber supply chain at a national level (possibly through the creation of a supplier / procurer joint venture), creating the potential for large scale supply chain logistical efficiencies across the industry.
- ▶ Moving from geographically linked MR sale structures to log supply contracts from ‘supply regions’. The true potential for efficiencies in timber supply allocation and haulage logistics can only be reached if the prevailing constraints of the geographically (SP/MR) linked timber supply system are removed.

Estimated cost savings associated with this phase are modest (circa 2.0%) and are primarily associated with more efficient utilisation of our haulage infrastructure. However, it should be noted that the Phase 3 strategy of moving to a system of 100% mill-gate log product supply would secure potential savings associated with Phase 2, savings which may not be fully attainable under the dual system of standing and harvested sales.

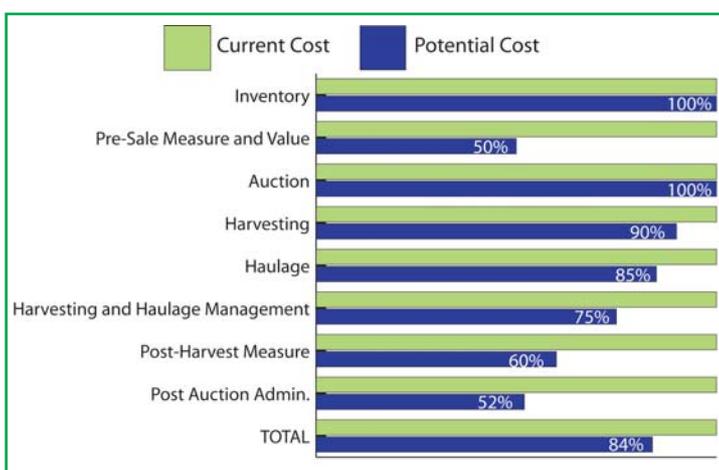


FIGURE 7: Potential cost structure of the reconfigured timber supply chain (expressed as a % of the current cost structure).

Recommendations

The project consultants and project steering committee believe that the OptiLog strategy presented in this document represents the most logical approach to making real progress in overcoming current inefficiencies within the timber supply chain.

The vision of a more industry integrated timber supply chain based on partnerships between the sawmills, panelboard mills and Coillte is a radical move from existing, non-integrated dual structures of supply chain management. However, a fundamental objective of the Irish timber industry is to reduce process costs, including costs within the timber supply chain. There is significant cost saving potential associated within the OptiLog strategy.

Figure 7 outlines an estimate of the potential cost structure of the reconfigured timber supply chain (expressed as a percentage of the current cost), following the implementation of the three phased strategic plan. Table 1 summarises estimates of potential cost savings.

These potential savings should incentivise industry members to consider a radical restructuring of the timber supply chain, as prescribed in the OptiLog strategy.

The practical development and implementation of both minor and major efficiency based changes within each phase of the OptiLog strategy will require considerable industry co-operation. Shared vision amongst our industry’s members and provision for expert project planning and management is a vital precursor to any effective change.

TABLE 1: Summary of potential cost savings associated with the OptiLog strategy.

Timber Supply Chain Cost Category	% Savings
Pre-sale and post-harvest timber measurement/valuation	49%
Timber supply chain management and administration	30%
Harvesting and haulage operations	12%
Total	16%