



# WHAT'S A PICTURE WORTH?

HOW MUCH CAN SATELLITE IMAGERY BOOST AN ECONOMY? EARSC DECIDED TO FIND OUT HOW MUCH FINLAND PROFITED BY REPLACING HELICOPTERS WITH SATELLITES, REPORTS GEOFF SAWYER

The use of satellites benefits people in many ways of which they are rarely aware. For example, the citizens of Finland benefit from satellites because the imagery is helping to keep their supermarkets supplied with goods and their factories open. We wanted to examine this in more detail and to calculate just how much the use of satellite imagery is worth to the Finnish economy.

Not many people know that 'Finland is an island'. Clearly, it is not an island in a classical sense, but since more than 90% of its imports and exports come by sea, it has one of the main characteristics of one. As all Finland's ports freeze over in a normal winter, helping cargo ships to navigate the ice is of strategic importance to the Finnish government and people.

Finland's neighbour, Sweden, is also seriously affected by this problem, which has led to a close co-operation between the two governments to run an effective and efficient ice-breaking service. The Finnish government decided in 1971 to keep 25 major ports open throughout the year, leading to investments in ice breakers. Until 2003, each ice-breaker was equipped with a helicopter, which flew over the sea-ice seeking out the best route. But in 2003, the helicopters were replaced by the use of satellite radar imagery, which had several advantages.

Firstly, helicopters can only cover a limited area around the ship whereas the satellite images show a summary view of the whole of the Gulf of Bothnia. This enables routes to be plotted through the ice right to the port, which is a major benefit to the operation.

Secondly, when the weather gets bad and the ice conditions are at their most changeable, the need for an accurate picture is at its most acute. But that's just when helicopters cannot fly. However, with radar satellites, images can also be taken at night and the imagery cost is a lot less than operating the helicopters.

The use of the imagery enables ship captains to plot shorter and more efficient routes to the port, which helps both the ice breakers as well as the ships being guided to save fuel. The ships are also saving time, which translates into lower charter costs and better use of the ship to carry cargo.

Without the use of icebreakers, ships can become stuck in the ice and take an indeterminate number of days to reach their destination.

Hence, clearing the sea lanes provides greater certainty about the time of arrival of the ship, helping the ports to operate more efficiently and the factories being served by the ports to plan their just-in-time production better. Indeed, without the icebreakers, the factories could at best work eight or nine months a year, at worst not work at all.

How much is all this worth? We are testing a new methodology that lets us look at each step in the value chain and analyse the benefits. Our analysis leads us to calculate a total economic benefit to the Finnish and Swedish economies of at least €24m and up to €116m per annum.

Of the total benefit, €2.3m comes directly from the cost savings of ice-breaker operations, the cost of the helicopter and lower fuel cost from taking shorter more effective routes. A further €2-3m comes from similar savings of fuel and lost time for the ships serving the Finnish and Swedish ports. Further benefits accrue to the ports (€6-9m) through more efficient operations but the main gain is to the factories (€6-€63m).

The cost of using satellite imagery is rather low. Imagery currently costs around €250k per annum but this will fall to zero through the use of ESA's Sentinel 1, which is a polar-orbiting, all-weather, day-and-night radar imaging mission for land and ocean services. The processing costs are low and the images are sent to the ice-breakers through the existing IBNet information system. So the benefit is around 100 times the cost as a minimum and could be as high as 500 times. Clearly a good deal!

Satellite imagery touches everyone in Finland. With greater certainty of arrival of the ships, they are employed throughout the year in working factories and can be more assured of having fuel to heat homes and power cars as well as fully stocked supermarkets and pharmacies. Satellites are really benefiting citizens.

## SATELLITE IMAGERY TOUCHES EVERYONE IN FINLAND

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