DIFFUSION OF RESULTS OF FOREST RESEARCH

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Introduction

Any research will fail, when ist results are not diffused.

The process of diffusion is the spread of a new idea, a result, a method, a medicine from its origin of development to its adopters. Research on diffusion is mainly carried out in relation to anthropology, early sociology, rural sociology, education, industrial sociology and medical sociology. In particular rural sociology has contributed to the present knowledge on diffusion by a great number of studies and publications. Most of these are dealing whit the agricultural extension.

On the results of research on diffusion in the field of rural sociology an efficient extension service for agriculture in the Netherlands is based. In many places in the world forest research workers think that too big a gap exists between research and practice. There is a retarded adoption or lack of it or sometimes even interest for new ideas is not present. On the other hand it has been noticed now and then that forestry practice is complaining about research programmes not being adequate. Apparently there is something wrong in diffusion of new ideas in forestry. In this contribution attention will be paid to a number of aspects, important to be considered by analysing any diffusion process.

To a great deal is referred to the studies of LIONBERGER (1) and ROGERS (2).

Norms and diffusion

Every social system has its specific pattern of behaviour, which is called the norm of that particular social system. It is clear that norms are affecting the diffusion of new ideas. In rural sociology one has distinguished two distinct types of norms. These are: traditional and modern.

A social system with modern norms has been developed more technologically and is cosmopolite, literate, rational and empathetic.

Traditional norms tend to include low technological development, local relationships, low level education, lack of rationality.

It is obvious that a social system with modern norms will be more diffusable than a system with traditional norms. Concerning forestry, it will be difficult to distinguish in different norms. Nevertheless there is a tendency towards traditional norms with forestry in countries with a long forest tradition. On the other hand countries, where forestry is more recent, will tend to maintain modern norms.

It is quite presumable that this might be the reason for a less efficient diffusion of results of forest research in the countries with more traditional norms. At least the gap between research and practice seems to be larger overthere.

One of the findings of research on rural sociology shows, that farmers with modern norms, but living in a traditional social system adopted fewer new ideas, than if they should have lived in a modern community. It may be assumed that this phenomenon will not be different with foresters.

The adoption process

The adoption process is the mental process to which an individual is exposed, from the moment of first learning of a new idea till complete adoption. Complete adoption is the decision to make full use of the new idea in continuation.

Although there is not complete agreement on the number of stages of which the adoption process consists, the following number of five is generally accepted nowadays.

1. Awareness. The individual is confronted with the new idea, but lacks complete information. He is informed of its existence, without looking for it.
2. Interest. The individual becomes interested in the new idea, and is collecting information. The way he interpretes the information may be affected by his personality and by the norms of his social system.
3. Evaluation. The individual is evaluating the new idea for trial. In this stage he comes to the decision whether to try it or not.
4. Trial. The individual applies the new idea on a small scale to test it for his own use. He will consider the results of this trial very carefully to make the right decision.
5. Adoption. In this stage the individual decides to continue the full application of the new idea.

This adoption process does not need to be continuous. At any stage the new idea may be rejected, even after adoption. The last case is defined as discontinuance. Rejection is defined as the decision of not adopting the new idea at all.

During the adoption process information of the individual about the new idea is essential. In general this information is originating from impersonal and personal information sources. Impersonal information sources are important at the first stages of the adoption process. These belong mainly to mass communication systems as radio, television, publications. For the later stages of the adoption process the personal information sources are more effective, mainly because of their "two-way" character. To conquer resistance or apathy, personal information will affect positively the adoption. Impersonal information sources have a somewhat more general character, while personal information sources are linked with local conditions. The adoption period is the time, required for an individual to pass

the complete adoption process.

It was observed that this period is varying for different individuals. Character, education, intelligence, age, social status and other personal qualities are decisive factors for the length of the adoption period. This had led to the definition of different categories of adopters. For the diffusion of results of forest research all these aspects should be discussed. It is of no use to introduce new ideas for trial or full use into forest practice, before practice has got interest in it. New ideas have to be spread in general terms to make forestry practice aware of this existence. This has often been omitted and new ideas or methods are proposed for full use in too early a stage. Another problem in introducing new ideas in forestry is the failure of sufficient information sources of personal character at the final stages of the adoption process. An example is the introduction of chemical weed control in particular control of grasses in conifer plantations with dalapon. In the trial stage a number of foresters rejected the method, because of insufficient personal information. Poor results of non-correct experiments, carried out by the adopters, were not brought into personal discussion between research worker and forester.

Research has to be accompanied by information in order to achieve adoption of the results of research. And this information is insufficient when only impersonal. In other words, forestry research has to be combined with effective extension.

New ideas

Some ideas will be accepted in a short time, while others will require many years of introducing under similar conditions. It is obvious that the explanation must be found in the nature of the idea itself. One example of a rapid diffusion of a new method is the stripregeneration of Douglas-fir in Holland. Originally Douglas-fir was planted under canopy of a heavily thinned old stand, but when it was proposed to give the required shelter for the Douglas-fir plantation in East-West strips of the old forest, forestry practice soon made full use of this idea. The advantage of the method was better growth of Douglas-fir, less damage by felling old trees and less attack by Hylobies abietis and Phomopsis pseudotsugae. Ahother example is chemical weed control in plantations. Although advantageous in relation to growth and cost, it lasted many years before full scale application took place. The nature of new ideas in relation to their difference in diffusion under comparable conditions can be classified in five categories.

1. Relative advantage. These kind of new ideas may have an economic profitability, but other appreciations play an important if not a decisive role. The relative advantage of a new idea may be emphasized by a crisis, which affects its adoption. During the years around the 1960´s more Scots pine was planted than Douglas-fir on soils suitable for the latter species, because of lower afforestation cost, although yields are much higher with Douglas-fir in any case. The climatic condition in those years, however, causing damage by late-frost in Douglas-fir plantations, was decisive in adopting the cheaper Scots pine method. An apparently economic advantage, with a crisis as the main cause of adoption.

2. Compatibility. This means that the new idea has to be in accordance with the norms of a social system. Many of the new ideas of forest research are not compatible. In particular in countries with traditional forestry. In the Netherlands for instance it was very difficult to introduce the one-species afforestations, because in the social system of forestry the principle of mixing economic tree species in the spectrum of natural species to prevent soil deterioration was a basic conception. It took many years before the norm had changed sufficiently, and the new idea was fully used in continuation.

   Introduction of chemical weed control still struggles with this problem of compatibility in a forest system, where nature conservancy is an important topic.

3. Complexity. If a new idea is complex by its nature and therefore difficult to apply this will affect its adoption. In forestry it can be observed, that for instance regeneration methods by clearfelling and large scale afforestation are more easily adopted than complex methods of strip regeneration or plenter systems. Mechanical methods of weed control, even if these are less economical and may have ecological disadvantages, are preferred to the complex methods of chemical control. There is a clear tendency in forestry practice to give preference to non-complex methods.

   Therefore either personal information has to be favoured or ideas should be developed in more simple constructions.

4. Divisibility. A new idea which is complex, but can be tried on a small scale or on part of an production process will be more easily adopted. In forestry for example a new kind of planting material will find its way rapidly to the trial stage, but the introduction of it together with other spacement, other methods of soil preparation and other weed control as one complete new idea will meet more resistance. It might be important to increase the divisibility of new ideas for a better diffusion of more complex ideas as whole.

5. Communicability. New ideas which can easily be communicated within a social system will be adopted more rapidly than those which are not. Communicability is related to the visibility of the value of new ideas. In forestry it is very obvious that new ideas, which can be demonstrated in experimental plots, without complex calculations, but by already just looking at it, always have a relatively short adoption period. In particular, when the effect of new ideas can be obtained in a short time. Sometimes this can be misleading. Very demonstrative in this relation in the Netherlands was the complete soil cultivation. Although it was already known, that complete soil cultivation on sandy forest soils after a number of years led to soil deterioration and consequently to growth disturbances 10 to 30 years after planting, the better growth and the more homogeneous condition of the plantations in the first years, hampered the adoption of the better method of non-cultivation.

   The communicability, the complexity, and even the divisibility of the non cultivation method was in disfavour to the method of complete soil cultivation.

Of course there might be mentioned other characteristics of new ideas influencing adoption, but those mentioned above are demonstrative and moreover research in

this respect is not conclusive at all at this moment.

The task of research is not only to develop new ideas, but also to be aware of its characteristics. Diffusion of new ideas has to be adjusted to those characteristics.

Adopter categories

It will be clear that, as adopters are individuals each with its own qualities, the rate of adoption will be largely determined by these individuals. By sociological research one has come to a number of five categories of adopters.

1. Innovators. These are individuals who are eager to try new ideas. They are venturesome by character and cosmopolite in relationships. They are willing to take risks and accept debacles and occasional failure of adoptions.

2. Early adopters. Individuals who are respected by their companions because of their opinion. They have a more local relationship and serve as a stable point of reference for the social system they belong to. They are asked for advice by their companions. This category of adopters is most important for diffusion of new ideas.

3. Early majority. They are just ahead of the average member of the social system. No leadership and an extended adoption period. Their willingness to adopt new ideas is deliberate.

4. Late majority. The adopters of this category are sceptical and will adopt new ideas ofter the average member of the social system. They must be pressed to apply new ideas and will not do that before the public opinion is in favour of the new idea.

5. Laggards. These adopters will be the last to accept a new idea. Adoption is hampered by tradition. What has been done in previous times is more important new ideas. In their social system these individuals are almost isolated. The laggard is always looking back.

It is obvious that effectiveness of the different sources of information is depending on the category of the adopter. For the early stages of adoption, impersonal information sources are more effective with the first two categories of adopters, while to achieve the stage of awareness personal information sources are required for the laggards. This interrelationship of categories, adoption periods and information sources is of great importance to be considered for diffusion of new ideas in forestry.

In general the innovators should not be active in forestry practice.

They will not show enough stability in management and administration being too eager to try out new ideas.

Innovators are optimate for research or extension. Probably more for research than for extension.

In the social system of forestry, the senior foresters should be chosen from the categories of the early adopters. When in forestry practice the individuals are belonging to the adopter categories 4 or 5 this will impede seriously the diffusion of results of research. Such can be the case in countries where forestry is traditional. As soon as tradition is entering the picture the attempts of introducing new ideas has to be forceful and efficient. In countries without forest tradition adoption of new ideas is relatively rapid. Good examples of efficient adoption can be found in countries like United Kingdom, New Zealand, Australia etc. In rural sociology research it was observed, that identical categories of adopters are not equal in different social systems. This is obvious in forestry.

Opinion leaders

As was mentioned before the category of adopters called "early adopters" are individuals who are respected by their companions in the social system because of their opinion. These early adopters are influential in respect to approval or disapproval of new ideas in a social system. A great number of names is given to this category, but "opinion leader" is generally accepted.

Opinion leaders are most important because of the personal information provided by them at different stages of the adoption process. Once the members of the social system are convinced by the usefulness of a new idea they will start to try it. At the evaluation stage of the adoption process personal information has the largest effect.

The key position of the opinion leaders in the diffusion process invite a more detailed analysis of their qualities. A general observation of the social position of opinion leaders shows that they conform to the norms of the social system they belong to, more than the average member. Or in other words, when a social system is traditional in its norms, the opinion leaders are less innovative than in case the social system is modern. The norms of the social system, as was mentioned before, remain more decisive in the adoption process than the opinion leader.

Although the opinion leader represents significantly the norms of a social system, they differ from their companions in information sources, cosmopoliteness, social relationships, status and innovativeness. Opinion leaders depend more on impersonal information sources, which are technically accurate and cosmopolite. They maintain a good survey of the literature in their field of activity and take part in technical and scientific discussions. They subscribe to more magazines than the average member of a social system. Opinion leaders in forestry are familiar with the international literature and situations.

The social behaviour of opinion leaders results in lively contacts with their companions and followers, so their opinion is very accessible. It is not necessary,

that the opinion leader is also the formal leader of a social system. In other words, a director of a forest service need not be automatically an opinion leader.

An opinion leader is born, not made. This should be kept in mind. It should be worthwhile to carry out research on the phenomenon of opinionleadership in forestry, as here the key for efficient diffusion might be found.

The impression is that opinion leaders in forestry exist, but that because of lack of knowledge on diffusion problems, these potential leaders are not used in a proper way.

Forest research

Forestry has a structure differing from agriculture in such a way that in the social system producers of new ideas (research) and adopters (forestry practice) according to their social status, education, intelligence and norms have much more in common than farmers, agricultural research scientists and extension agents.

The social system in forestry- the individuals of which have many relationships - is more homogeneous than in agriculture.

Societies with producers of new ideas and adopters as regular members are general. Apparently there should not be reason for complaint about lack or insufficient diffusion of results of forest research. But there is. It would be expected that the adoption process, because of the smaller and more identically orientated group of individuals, would take place smoothly. This not being the case some meditation is not out of place.

It is obvious, that no or only very limited research has been executed in the field of diffusion of new ideas in forestry. However free use can be made of the results of research in rural sociology, since many findings are applicable to forestry as well.

In particular concerning the adoption process and the adopters not much has to be added to what is mentioned in the foregoing paragraphs.

It might be that in relation to research workers or producers of a new idea in forestry, some characterisation should be checked upon.

In the population of research workers variation in orientation towards new ideas and its diffusion can be observed. To obtain a more concise picture meditation will be restricted to silviculture and silvicultural research.

Silviculture is based on different disciplines and aims to grow forests on the principle of sustained productivity. Examples of these disciplines are ecology, physiology, botany, genetics, pathology and so on.

The organisation of silvicultural research interacts with the organisation of forestry

practice. In case the adopter the individual charged with forest administration - is specialised in silviculture more than in organisation, he can adopt new ideas from research workers specialised in the basic disciplines of silviculture.

In most cases, however, the adopter will be charged more intensively with organisational activities. In such cases new ideas from the specialist research workers will be less compatible and the need for an information source between adopters and scientists becomes necessary.

Under these circumstances the silviculturist, being a combination of research worker and adopter will function as the information source. He has to know exactly the norms of the social system - or in other words- the problems and needs of forestry practice and on the other hand he must be capable easily to adopt the new ideas of the specialised research worker.

Therefore it might be concluded, that, as with the adopters, research workers can be categorized. Without any pretention of completeness a try could be as follows:

1. The silviculturist. His qualities should be comparable to those of the innovators and early adopters. Eager to try new ideas, cosmopolite relationships, effective social behaviour, venturesome. Able to inform specialists of items for their research programme, which are in accordance with the norms and needs of forestry practice. Respected by the adopters as an opinion leader. Functioning as an intensively consulted information source.

   He must understand complex problems and ideas and be willing to accept failures. In fact he is more adopter than producer of new ideas.

2. The applied research specialist. His qualities are comparable with those of the early majority of the category of adopters.
   Successful, because of his carefulness in his approach.

   Respected for his opinion by this colleagues and silviculturists. Interested in specialised research as long as it is of practical value. His relationships are cosmopolite and in general not local at all, although restricted to the specific field of activity.

3. The back-ground research worker. Not interested in research with direct practical significance. Follower of the foregoing category. Adopt new ideas for his research from them. Will probably withdraw easily into his own work, without isolating himself. Need continuous information to prevent loosing himself in too many details.

4. The pure research worker. Interested in problems he accidently met and got interested in. No relationship with other research workers, except those with same interests. More or less isolated, but capable in scientific respect.

It is obvious that need for better definition exists in order to understand how to

organize the production of new ideas and how to diffuse them efficiently. Diffusion of results of research is not only depending on adopters, but also on producers of new ideas.

To decrease the gap between research and practice research on the problems of diffusion in forestry is absolutely necessary. A start to that should be given as soon as possible.

Literature

1. LIONBERGER, H. F.

Adoption of new ideas and practices. 1959

2. ROGERS, E. M.

Diffusion of innovations. New York, Free Press, 1969. 367 pp

Résumé

Chaque système social a sa propre structure qui exerce une influence directe sur la diffusion de nouvelles idées.

Le procès d´adoption, c.à.d. le procès mental auxquel l´individu est exposé dès le premier contact avec une nouvelle idée jusqu´à l´adoption finale et complète de cette idée, comprend différents stages (la prise de connaissance, l´intérêt, l´évaluation, l´essai et l´adoption).

Souvent des idées nouvelles seront acceptées dans un bref délai, tandis que dans d´autres cas ont aura besoin de plusierures années.

La durée de cette période dépend des caractéristiques de l´idée même et de sa répercussion sur le systèm social (avantage, compatibilité, complexité, divisibilité, communicabilité).

Concernant la communication même de nouvelles idées il est indispensable de prendre en considération l´existence de différentes catégories d´adopteurs (réceptuers) et de différents types de formateurs d´opinions (émetteurs).

Quant à la diffusion d´idées dans le domaine forestier, il faut tenir compte du fait que le systèm social dans la sylviculture est plus homogène que p. ex. dans le domaine de l´agriculture. Ceci implique que les producteurs de nouvelles idées et les adopteurs possèdent beaucoup de traits communs.

Pour la propogation efficiente de nouvelles idées dans le domaine forestier il pourrait être utile de classer les adapteurs en différentes catégories (sylviculteurs, spécialistes en recherches appliquées, chercheurs d´information de base et chercheurs dans le domaine de la science pure).

Zusammenfassung

Einführung von Forschungsergebnissen in der Forstwirtschaft

Jede Gemeinschaft hat ihre eigene Struktur, die einen direkten Einfluss hat auf die Verbreitung und Einführung von Neuerungen.

Das Adoptionsprozess, d.h. das geistliche Prozess woran ein Individuum ausgesetzt ist vom ersten Kontakt mit einer Neuerung bis die endgültige und vollständige Adoption, ist zusammengestellt aus verschiedenen Stufen (der Bewustsein, die Interesse, die Wertung, die Überprüfung und die endgültige Annahme).

Manchmal werden Erneuerungen in kurzer Zeit akzeptiert, während Andere eine viel längere Zeit zum Verbreitung brauchen.

Die Dauer der Adoptionsperiode hängt ab von den Eigenschaften der Erneuerung an sich und seine Zusammenhänge mit der Gemeinschaft (Vorteil, Verträglichkeit, Kompliziertkeit, Erteilbarkeit, Mitteilbarkeit).

Mit Bezug auf die Verbreitung von Neuerungen ist es notwendig, die verschiedenen Kategorien der "Adopter" und Meinungsbildner (Opinionleader) zu betrachten.

Es muss damit gerechnet werden, dass die forstliche Gemeinschaft als soziales System mehr einheitlich ist, wie die landwirtschaftliche Gemeinschaft. Das hat zur Folge, dass die Untersucher (die Produzenten der Neuerungen) und die Praktiker (Adopter) viele Verbindungen haben.

Für eine zweckmässige Verbreitung der Neuerungen in der Forstwirtschaft, könnte es angebracht sein, die Untersucher, wie die Adopter, in verschiedenen Kategorien zu klassifizieren (Waldbauer, Spezialisten für angewandte Forschung, Spezialisten für Grundlagenforschung und Spezialisten auf dem Gebiet der reinen Wissenschaften).